

HIMALAYAN
FERNS.

310

for Henderson

from the author

A
HANDY GUIDE
TO THE KNOWN
FERNS OF THE HIMALAYAS
OF
Northern India,

BY

AN AMATEUR.

Dr. Postels 10th June 1877

LAHORE:

PRINTED AT THE CENTRAL JAIL PRESS,

1877.

J. Mahon, Manager Central Jail Press, Lahore.

Tobacco
Nov 27

My dear Henderson

I enclose a
list of names of persons
membering there. The list
found at Durham let I
have not searched much
there. I will see if I
can find any specimens
but I have not a regular
collection I was out of
at Durham for 6 days last
year and was not there
for many years before
I have has reported me
to Governor for knowledge
have a very respectable way of

He replied that so far
from threatening him I should
not even report him for
being absent for six weeks
in the Cholera season
without any leave. Townsend
states that Sumner's absence
is quite groundless but does
not seem to blame him
he has however ordered him
to explain his absence
Sumner there is going to prove
that he was not afraid of
Cholera. This conspiracy
began on the 12th of December
and I do not think it will
finish till the next
Sept General comes - all
this must be forgotten

Since then there has been some
and his wife does not
say nothing to come out
of London which she considers
a very unhealthy place
He had also little more
than 2 years to serve so
he thought he might as
well serve it in a healthy
climate I think also the
fact that James has a
great deal of the preacher
had something to do with
it though he does not
say so

Center rather wants to go to
Tampabay as a last but I
am not sure what he will
do

Would you be kindly enough
to send a list of plants which
to and 3 of others as there
is a very dry season -

I find most of the leaves
of the plants but a few are
lost - and some I cannot reach
or I will

I am
your servant

C. B. Brown

From a collection

From a Dalhousie number

<i>Adiantum candidum</i>	+	<i>Asplenium nigropunctatum</i>
<i>Capillus Venus</i>	+	" <i>Japonicum</i>
<i>Vernonia</i>	+	" <i>Polytrichum</i>
<i>Chelidonium Dalhousie</i>	+	" <i>Septentrionale</i>
<i>Farinaria</i>	+	<i>Aspidium aculeatum</i>
<i>Orychium japonicum</i>	+	<i>Urtica dioica</i>
<i>Pteris longifolia</i>	+	<i>Polypodium opacum</i>
<i>Cheilanthes</i>	+	<i>Odoratum</i>
<i>Aquilegia</i>	+	<i>Intermedium</i>
<i>Asplenium album</i>	+	<i>Polypodium</i>
<i>Trichomanes</i>	+	<i>Polypodium</i>
<i>Farinaria</i>	+	<i>Polypodium</i>

“ Ruhige Pflanzenwelt, in deiner kunstreichen Stille
vernehme ich das Wandeln der Gottheit ; deine verdienst-
lose Trefflichkeit trägt meinen forschenden Geist hinauf
zu dem höchsten Verstande ; aus deinem ruhigen Spiegel
strahlt mir sein göttliches Bild.”

Schiller Der Menschenfeind.

Scene VII.

CONTENTS.

	<i>Page.</i>		<i>Page.</i>
PREFACE		ANALYSIS OF GENERA ...	1
INTRODUCTION		ANALYSIS OF SPECIES ...	7
Caudex		Actiniopteris	4, 32
Collecting apparatus		Acrostichum	5, 60
Desmobryoid series		Adiantum	3, 16
Dimorphous fronds		Allantodia	4, 32
Eremobryoid series		Alsophilla	4, 8
Frond		Angiopteris	6, 64
How to use ANALYSIS		Antrophyum	5, 59
Local names		Aspidium	2, 32
Method of classification		Asplenium	3, 23
Mode of collecting		Blechnum	3, 22
Pinnæ, their form		Botrychium	6, 65
Scales		Brainea	5, 58
Sori		Ceratopteris	3, 22
Spores, how to grow them		Cheilanthes	3, 17
Stem		Cryptogramme	18
Surfaces		Cyathæa	1, 7
Texture		Cystopteris	2, 14
Venation		Davallia	2, 12

CONTENTS.

	<i>Page.</i>		<i>Page.</i>
Diacalpe	1, 8	Onychium	3, 18
Dicksonia	1, 9	Onoclea	1, 8
Drymoglossum	5, 60	Oleandra	2, 46
Gleichcnia	4, 7	Ophioglossum	6, 64
Gymnogramme	4, 57	Osmunda	5, 63
Helminthostachys	6, 65	Pellæa	3, 18
Hemionitis	5, 60	Platycerium	5
Hemitelia	1, 7	Polypodium	4, 48
Hymenophyllum	2, 9	Pteris	3, 19
Kaulfusia	6, 64	Schizea	5, 63
Lindsaya	3, 15	Sphæropteris	1, 9
Lomaria	3, 22	Trichomanes	2, 11
Lygodium	5, 64	Vittaria	5, 59
Marattia	64	Woodsia	1, 9
Meniscium	5, 59	Woodwardia	23
Nephrodium	2, 35	GLOSSARY	
Nephrolepis	2, 46	List of Species collected, Simla	
Nothochlæna	5, 57	INDEX	

PLATE I.

Fig 1. WOODSIA.

2 DICKSONIA. *Balantium*.

3. HYMENOPHYLLUM.

4. TRICHOMANES.

5—6. DAVALLIA. 5.—*Humata*.

6. Eudavallia.

7. LINDSAYA. 8.—ADIANTUM.

9. CHEILANTHES.

10. PTERIS. *Eupteris*.

11. ASPLENIUM. *Euasplenium*.

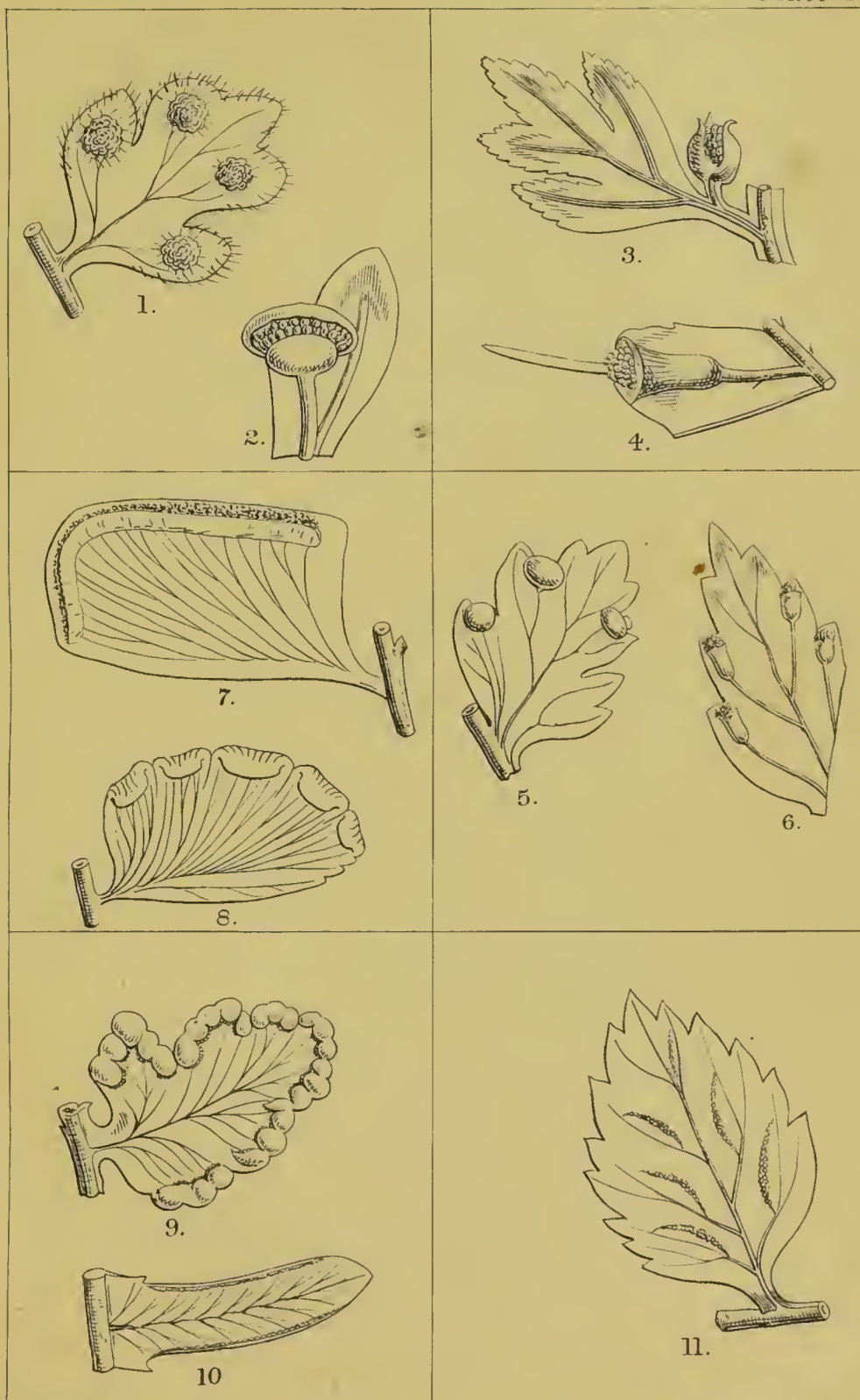


PLATE II.

12. ASPIDIUM. *Polystichum*.

13. NEPHRODIUM. *Lastræa*.

14—17. POLYPODIUM.

14. *Eupolypodium* segment. 15.—*Goniopteris*.

16. *Phlebodium*. 17.—*Campyloneuron*.

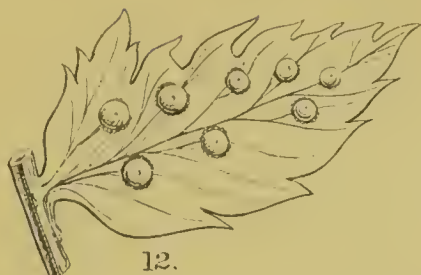
18—19. GYMNOGRAMME.

18. *Eugymnogramme*, pinnule.

19. *Stenogramme*, fert. portion.

20. DRYMOGLOSSUM, st. and fert. frond.

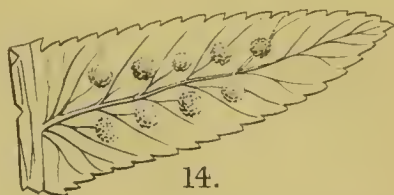
21. ACROSTICHUM. *Elaphoglossum*.



12.



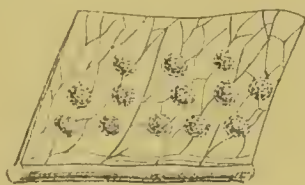
13.



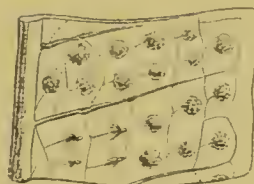
14.



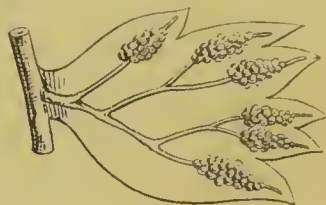
15.



16.



17.



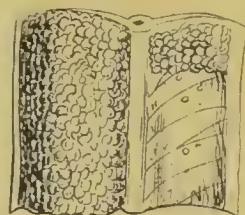
18.



19.



20.



21.

PREFACE.

THE pursuit of pteridology is at once a convenient inducement to healthful recreation in the midst of beautiful scenery, and a stimulus in one of its most attractive forms to the further study of Natural History, which is so useful and powerful a training of the faculties of observation. For Ferns,—the tender gracefulness of which is everywhere allowed, unfolding from a stem whose slender unsightliness gives no heed to the opulence of beauty so suddenly to be displayed with a fidelity of likeness reproduced in minutest detail, through a marvellous delicacy and exactness of cutting that may well excite our wonder,—will not alone continue to absorb the attention. Perfumed orchids curious in growth and flower, panicked grasses and graceful lycopods, sculptured mosses and painted lichens ; precious gems in river beds, land shells and occasional fossils, offering Earth's history as she has imprinted it ; butterflies mimicking one another's painting, sole bright colour between precipice and stream ; beetles brilliantly spotted ; birds of gayest plumage, more than 1,600 in number ; most gorgeously-coloured of all ocean fishes, most delicately painted of all sea shells, woo the lover of Natural History in these lands.

Collection and nomenclature are then but first steps in a world of admiration and wonder ;—with increasing knowledge of the natural objects around us, in reverent enjoyment of all which the Creator for His pleasure has

ordained, our own existence as head and prime creature of all, becomes dignified above the strife of faction, the fretfulness of petty cares :

“He liveth best who loveth best,
All things both great and small ;
For the good God above us,
He made and loveth all.”

This pursuit, too, leads us into contemplative solitude in the gloom of forests, whose hushed stillness, waved with the alternate hum of cicalas, is broken but by the infrequent alarm of a bird, or the graceful vault of a monkey. 'Mid pine-clad precipices looming over water-falls, whose force working in ceaseless detrition, measured nor utilised by human machinery, is so compassed by brush-wood, fern and crag, that the roar of its toil disturbs not the harmony immediately around, till, soothed and overflowing in gentle stream, the waters again glide softly along or plash playfully from boulder to boulder in most musical of ripples, haunted by butterflies.

Amid this ceaseless activity of growth and decay,—of power migrating from form to form,—we may imbibe somewhat of the perfect repose which envelops it, and, braced with renewed energy, return contentedly to our own more immediate labours :

“O forest green and fair, O pine tree waving high,
How sweet your cool retreat, how full of rest.
Here free from care and pain ; gay as a child again,
Peace and contentment reign
Within my breast.”

INTRODUCTION.

THESE pages are intended for those who, having only a limited knowledge of Botany, are not satisfied with admiring and collecting Ferns, but would willingly become better acquainted with such species as grow in their immediate neighbourhood, were they not deterred by the difficulties attending a voluminous reference or a minute scientific phraseology.

2. By a few characters capable of easy observation, the ferns growing in the Himalayas and Northern India, regionally grouped apart from all other species, can be readily distinguished by comparison one with another. Character, where it could possibly be avoided, has however not been taken from what would seem a ready distinction, *i.e.*, *size*, for the reason that it is subject to most variation; intermediate plants of stunted growth would often have been difficult of recognition. Those who desire fuller information,—and it is the object of this Guide, by making its access more easy, to stimulate, and not to satisfy,—should procure Hooker's *Synopsis Filicum*, edited by Baker, (Hardwicke, 1873) which is now the standard work on this subject. Rudimentary principles of Pteridology may be further studied in Oliver, Balfour, or any other botanical work at hand. Beddome's *Ferns of British and Southern India* contains figures of most of these species, to which reference has therefore been made for those who are able to consult so valuable and

useful a work, and a few species will also be found in the magnificent folios of Wallich. Fern plates are, however, of less assistance to the young student than is commonly supposed, not only from the extent of variation in many species, but because only enlarged portions of a frond are usually given, and not drawings of the whole plant as it is seen in life. Lowe's Ferns contain such lifelike coloured figures, but the work is necessarily expensive, and embracing the species in cultivation at home, which are largely Brazilian, has so few Indian, that it is not quoted in reference.

3. For collecting, a convenient case can be made of tin, 22 by 16 in., either ribbed or in 3 lengths soldered together for strength : and where a large collection is expected, a third sheet of plain tin of same size should be used as a middle leaf to equalise pressure. Perforated zinc if obtainable, is better ; and in dry weather, cardboard is lighter. Unvarnished brown paper may be placed in the case, and two straps united by a small one, as a handle, like a long H, passing through four soldered clasps, buckles all together, and these straps must always be kept sufficiently tight to prevent rubbing. Should roots also be collected, the smaller ones may be placed together evenly at one end upon the tin, root outwards, and afterwards this side must be placed on the ground for opening, and fronds filled in from next sheet upwards. Large roots should be slung together, and carried apart. Large fronds should be carefully divided by alternately oblique cuts, so as to facilitate their future correct readjustment, and in many

cases only portions need be preserved, one side with part of stem, or the top and lowest pinnæ for instance ; but no pinnæ should be torn off from rachis ; this latter should be cut above and below, and the opposite pinnæ shortened, so that the divisions of the frond continue to be shown. Fronds shrivelled and apparently undeterminable, may be recovered by softening in water, flattening, and again pressing.

Several fronds may conveniently be placed together in the pad ; they should be laid front downwards, especially when later removed to blotting paper, each slightly pushed upwards as the sheet is pressed down upon it, so that the segments are opened out.

If intended for the plains, roots should be packed in dry moss or earth in a tin case : they may also be sent safely by parcel post in cotton wool, packed in a cardboard box. For England they may be put in damp moss in a wax clothed box.

4. When on the spot it is necessary to note the general habit of a plant, its surroundings and mode of growth, colour and texture, and character of *root* ; shape, size, colour, and position of *scales*, if any ; whether hairy or naked, (seen by holding a frond horizontally against the light) ; all which can best be examined in the fresh plant. Fronds of different ages should be collected, and the position and shape of sori and of involucre,—which if *deciduous* will only be found on young seed—if possible determined.

5. On the day after collection, the fronds should be carefully laid in the same manner as before, between sheets of blotting paper, and when all foldings are opened out, so that each segment is in position, subjected to moderate sustained pressure, under a board on which a stone or other convenient weight is placed. This paper, whenever damp, and at first daily, must be replaced by dry ; with delicate plants, such as *Athyrium Oxyphyllum*, it is better to avoid deranging the fronds by laying an extra dry sheet upon them, at first on one, then reversing the whole, on the other side.

6. During this drying process, cases should be prepared for each genus, or for groups of genera, according to extent of collection and amount of duplicates into which the dried specimens can be at once sorted by genera. This will facilitate comparison and identification, after which the species themselves may be systematically arranged. It is always convenient to make a preliminary list of the ferns reported to have been found in the particular locality, with a column of altitudes, as a rough indication of what to look for in the neighbourhood. Lists of older collections may thus be utilised, care being taken that the fronds were actually gathered at the place. Species are often very locally restricted, and the exact place of collection should always be noted under the name, as well as the nature of locality,—rock, tree or marsh, &c.,—and date, so as to render such information of value.

7. Ferns may be discovered which are not included in this Guide. If not variations, they will either be known neighbouring species, extending into this region from south, west, or north ; or altogether new. These may be referred to some experienced friend, or if not then identified in Synopsis Filicum, referred to the Herbarium at Kew, in a complete state with root, &c., and in fructification not too far advanced ; if possible, fronds in different stages should be forwarded.

8. So much difficulty is often experienced through not obtaining definite ideas of the exact meaning of scientific terms from a glossary alone, that the following botanical explanations with illustrative local examples, will no doubt be found to facilitate the preliminary study of pteridology.

9. FERNS, thus, have a *root*, *caudex* or large, *stipe* or small, stem, and a *frond* ; and in *Lygodiums* a *petiole* or pinnule stalk. The caudex has (*basal*) *scales* at base, and is sometimes *arborescent*, forming a tree, as in *Cyathea*, *Hemitelia*, *Alsophilla*, and in some *Dicksonias*.

10. The *root* is descending like other plants, or a *rhizome*, creeping either above ground as in most *Davallias*, or beneath (*Hypogæous* underground) as in *D. immersa*, *Polypodium urophyllum*, &c. ; *villose* as in *P. punctatum*, &c. The mode of junction of stem and caudex divides ferns into two series ; *Desmobryoid* when these are continuous one with the other, as in *Asplenium*, *Nephro-*

dium ; *Eremobryoid* when articulated as in Dav. (*humata*) *Eupolypodium*, (*gonioph*) &c.

11. The stem is *tufted*, (*Nephr. barbigerum*, *Asplenium nigripes*), *scattered* (*Aspl. resectum*), *polished* (*Adiantum Cap. veneris*) *tomentose*, (*Cheilanthes rufa*) *wiry*, (*Adiantum caudatum*) *green* (*Aspl. viride*), *aculeate* (*Cyathea spinulosa*), *viscid* (*P. punctatum*), *fibrillose* (*Cheilanthes varians*), *ferruginous* (*Nothochlæna Marantæ*). It is either *arborescent* (*Cyathea*), *subarborescent*, (*Aspl. esculentum*), *erect*, (*Aspl. maximum*), *branched* (*P. proliferum*, *Lygodium* and *Gleichenia*), *dichotomous* or branching in pairs, (*Gleichenia dichotoma*). In *Gleichenia* and *Lygodium* it is called a *stipe*, and in the latter, *petiole* is used for the *primary* (from main stem) and *secondary* (from last again) stalk of *pinnule*.

12. The *frond* is in shape *spathulate* spoon-shaped (*P. adnascens*), *lanceolate*, or lance-shaped (*Cheil. varians*) *ovate* or egg-shaped, (*Onychium japonicum*), *deltoid* or triangular as the Greek letter delta (*P. Dryopteris*, *N. sparsum*), *Ad. venustum* ; or these are modified by combination as *oblong-lanc.* (*N. spinulosum*) ; *ovate-lanc.* (*P. appendiculatum*, *Dipl. japonicum*), *ov. acuminate* (*Cheil. fragrans*), or by a prefix as *subdeltoid* partially deltoid (*N. cicutarium*) ; is *caudate* or tailed, (*Ad. caudatum* and *lunulatum*), when it roots again from its prolonged extremities. When young it is generally rolled like a crozier (*Nephr. barbigerum*) and the *vernation*, or mode of unfolding growth, is then *circinate* ; in a few species only

(Ophioglossaceæ), the veneration is *erect*. It is *entire* (Aspl. ensiforme, P. membranaceum) when altogether without cutting. When cut—the cutting estimated from the ultimate or final divisions,—it is *pinnatifid* when cut less than down to midrib or rachis, (Aspl. alternans, P. ebenipes, amænum) *pinnate* when cut down completely to rachis into separate *sessile* or unstalked *pinnae*, (Pteris longifolia, Woodsia elongata), *stalked below, sessile above* (Aspl. longifolium) *stalked* (Ad. lunulatum, Aspl. Trichomanes, Aspidium falcatum).

When the *pinna* is again partially or completely cut to its rachis, *bi* or twice is prefixed, and the frond is in the former case *bipinnatifid* (Aspl. japonicum Nephrocaneum and Filix Mas. P. auriculatum and appendiculatum) *bipinnate* in the second instance (Nephrobium barbigerrum Aspid. aculeatum); cut partially, or completely to this third rachis, it is *tri* (thrice) *pinnatifid* (Aspl. polypodioides, D. urophylla) *tripinnate* (Aspl. nitidum) respectively. Similarly divided partially or quite to fourth rachis, the cutting is *quadri*—(fourth) *pinnatifid* (D. chaerophylla Aspl. fimbriatum, Onychium japonicum) *quadripinnate*, (D. nodosa). A frond almost bipinnate is bipinnatifid only. If Onychium japonicum or any other finely divided frond be taken, and division by division broken off from the main stem, we have a ready illustration in cutting.

13. The following peculiarities of habit and growth are convenient to remember :—

EREMOBRYOID SERIES.

Humata }
Leucostegia } Davallia.

Oleandra.

Eupolypodium }
Goniophlebium } Polypodium.
Niphobolus }
Phymatodes }

Habit creeping. *Gleichenia*. *P. proliferum*. *Lygodium*.

„ arborescent. *Cyathea* *Hemitelia* *Alsophila*.
Dicksonia Barometz.

Frond dimorphous. *Dav.* (humata). *P.* (drynaria).

Acrost. (*Gymnopteris*). (*Chrysodium*). *Drymoglossum*.

„ grasslike. *Vittaria*.

„ matted beneath. *Nothochlaena* *P.* (*niphobolus*),
P. angustatum.

„ powdery beneath. *Cheil.* (*Aleusopteris*) *Gymnogramme* (*Ceropteris*).

„ with alternate divisions linear, cuneate, *Onychium*. *Aspl.* (*Darea*), *Actiniopteris radiata*.

„ with segments dimidiate. *Dav.* (*Odontoloma*).
Adiantum. *Lindsaya*.

„ or subdimidiate *Dav. immersa*.

14. As a rule, fertile and barren fronds do not differ ; when they do, the species is *dimorphous*, two-shaped : this is not a narrowing only of fertile frond which is a

common occurrence, *Pt. cretica* for instance, and due to inversion of margin, but a change of form, as in *Drynaria* (polypodium) when the sterile frond resembles a withered oak leaf, *Onoclea*, *Cryptogramme*, *Lomaria*, and many *Acrostichums*; among these also an intermediate difference is sometimes seen, as in *A. variabile* and *quercifolium*. It must not be forgotten that young fronds sometimes vary developmentally in shape and colour from the type, as *Woodwardia radicans*. Fronds are also often affected by their locality; *Ad. caudatum* exposed to the sun is coriaceous, under the next bush, subcoriaceous or herbaceous; and the cutting is much deeper in the former position. Plants in certain situations cease to be farinose as they develop, also with diminished cutting, as *Cheilanthes farinosa*, the *Ch. Dalhousiæ* of higher rock, where it grows more luxuriantly. Frond and stem are measured separately.

15. A change of cutting affects venation (§ 17) by the division not descending to lowest veins, which therefore unite in arches, *Pteris quadriaurita* thus probably assumes a so called *Campteriod* form as *pt. (compt.) biaurita*; a mode of variation which may also possibly extend to other plants at present reckoned as species, as *Aspl. ceterach* and *alternans*, &c. Whenever therefore an abnormal form is found affecting all the fronds of a plant, anything unusual in its surroundings should be noted, and its neighbourhood searched for intermediate stages of development. There is an obscure fern *Psilodochea salicifolia*, reported to have been found near Lahore, like

Angiopteris evecta, but without an involucre, which requires searching for and investigating.

16. Pinnæ are described also by the same terms as the *frond*, in regard to their shape, as *dimidiate* one half undeveloped (Aspl. heterocarpum and resectum) *oblong* (N. polymorphum) *lanc.* (Aspl. subtriangulare) *cuneate*, wedge-shaped, &c., *ffabellat cuneate* fan-wedge-shaped *to-cun* (Ab. lunulatum, Cap. veneris, &c.), and are *acute*, or sharp-pointed, (Aspl. planicaule), *acuminate* or longpointed (P. lineatum); and are *stalked* (Aspl. planicaule) or sessile without stalk (Ad. caudatum); are *spreading* (N. Molle & pteroides), *close* (N. cucullatum) *horizontal* (N. crinipes) &c. Their divisions are into *pinnules*, cut again into *segments*, which again may be *lobed*. These ultimate divisions are, as to shape, in similar terms, *blunt*, *acute*, *crescentic*, *oblong*, &c. and may further be *aristate*, armed or bristled, (Aspid. aculeatum). Some ferns are proliferous from upper surface of pinnæ, where a complete young plant is formed, as Woodwardia radicans, and some Aspleniums, especially bulbiferum. In Lygodium the *pinnule* is stalked or *petioled*.

17. *Venation* is the mode in which veins are arranged, and requires particular attention as affording the basis on which classification proceeds in subdivision of genera. It is *free* (Dicksonia) when the veins do not unite directly or indirectly with one another, springing from rachis as a main vein, and running towards or to margin, (Polystichum, Lastræa, Eupteris). When these

veinlets are unbranched it is *simple* (Darea) ; when branched, pinnately or irregularly, it is *forked* (Lastræa apiciflorum and Filix Mas.)

When the veinlets of contiguous groups, instead of being lost on the frond, or so ending at margin, unite, the venation is compound ; and this may occur in various patterns ; pinnately, the lower series meeting in arches, (Eunephrodium, Goniopteris) ; arching freely (Anisogonium, Meniscium) ; forming a network of *areolæ* ; when it is *anastomosing*, uniform and hexagonal, (Antrophyum Hemionitis) irregular, Cyrtomium, Pleocnemia, Cyrtomiphlebium) ; each areola including one or more free veinlets, one (Goniophlebium) two (Campyloneuron) two or more spreading, (Amphiblestra, Sagenia, Phymatodes, Selligaea). Main veins may (Campyloneuron Goniopteris) or may not (Phymatodes) be distinct to edge, or indeed throughout (Chrysodium) and all the veins may be observed (P. normale, Allosorus, Platyloma).

18. *Surfaces* are smooth or *glabrous*, rough or *scabrous*, covered with firm points or *muricate* ; short haired or *pubescent*, cottony or *tomentose*, coated with fine soft hairs or *villose*, (Woodsia elongata) ; *viscid* as in P. punctatum.

19. *Texture* refers to firmness of structure, and is *herbaceous* (D. chærophylla) *coriaceous* (Asp. aculeatum) *pellucid* (Adiantum) ; combinations and the prefix of papyraceous, and of sub again modify these terms, papyraceo-

herbaceous (Ad. lunulatum, Neph. dissectum) subcoriaceous (Neph. splendens and syrmaticum).

20. *Scales* are of various shapes, *peltate* or shield-shape, *ovate-lanc. linear*, &c. ; and are *adpressed* or closely adherent, *deciduous* or easily detached and falling off, *ferruginous*, rusty-coloured ; and vary through shades of brown to black. They are usually found on stems, but may extend to under-rachis, and are largest at base of stem. In describing these, *basal* scales should first be noted.

Having so far gained a general idea of these different parts, the following description of a few common species should be compared, step by step, with living specimens :—

P(olypodium) (Phym.) *membranaceum*, Don ; *rhiz(ome)* stout, scales ovate, spreading, membranous, lurid green ; stem 1—4 in. l.(ong), firm, erect ; *fr.(ond)*, 1—3 ft. l., 2—6 in. broad, edge entire or repand, both ends narrowed gradually ; *text.* very thin, membranous ; main *veins* distinct with very copious fine areolæ with free veinlets between them ; *sori* mostly in 2 rather irreg. rows near main veins.

A.(splenium) *alternans* Wall.(ich) ; st. tufted 2—4 in. l., clothed with linear scales ; *fr.* 6—8 in. l. 1—1½ in. br. lanc. obl.(ong), cut down into numerous bluntly rounded lobes on each side, which reach very nearly down to rachis, the lower gradually growing smaller and some-

times distinct; *text.* subcoriaceous. both surfaces an opaque greyish green; veins free, subflabellate; sori copious.

D.(avallia) (Leucos.) *chærophylla*, Wall. *rhiz.* wide-creeping, clothed with broad obtuse adpressed scales; st. 4—6 in. l., naked; *fr.* 9—15 in. l., 1 in. br. lanc. *delt.* 3 or 4 pinnatifid; lowest *pinnl.(nules)* 1—2 in. l., 1 in. br. cut down to narrowly winged rachis into deeply pinnatifid *segm.(ents)*, ult. lobes narrow and acute in fertile, rather broader in barren, fr.; *text.* thinly herb., rather flaccid; sori copious, at base of teeth of *segm.*, which they about equal in breadth.

21. The fructification at back of frond consists of groups of capsules (*sporangia*) covered (*indusiate*) or not (*non-indusiate*) by a membranous covering called the *indusium*, or more generally, *involucre*.

This *involucre* in shape is globose, (Cyathea, Dicksonia) reniform (Nephrodium, Oleandra) tubular (Davallia, Trichomanes) of same shape as sorus (Asplenium); it is lipped (Trichomanes, Dicksonia) or entire as generally; is in texture soft membranous (Woodsia) subcoriaceous (Woodwardia) coriaceous (Sphæropteris), formed of changed margin of frond (Pteridiæ); arising from beneath sorus and therefore *inferior*, (Cyathea, Woodsia) from above and *superior*, (Aspidium). Its character is best determined by the aid of young fronds, which should be observed in different stages of fructification. Many ferns shed their involucre early, it is *evanescent*, or *deciduous*; and since this envelope determines the shape of sorus and

the genus, species have often been described as nonindusiate from the involucre having already disappeared. Between the peltate centrally fixed involucre of *Aspidium* and the reniform one, attached by its sinus, of *Nephrodium*, many transfers have been made tending to the absorption of *Aspidium* in the latter genus.

22. *Sori* are arranged in definite relation with the veins, and their position with regard to these and to the margin and midrib must be carefully noted. whether *marginal* or *medial*, *submarginal*, &c. ; whether upon, or at end of vein or veinlet ; whether on both sides as in *Diplazium* and *Anisogonium*, In the nonindusiate orders, *Polypodium* and *Acrostichum*, the venation and the relative position of sori must be carefully noticed, often most readily by holding up the frond to the light, or to a lamp, and looking through. In all cases a small magnifying glass is necessary.

This fructification consists, not of seed, but of minute spores grouped in capsules (sporangia), encircled generally by an elastic jointed ring, complete or incomplete, and covered or not by indusium, through which these spores are in various ways discharged, and develop into cellular unisexual plants called *prothallia*, the male *Antheridia*, and the female *Archonia*. From the former a ciliated spiral filament emerges, and entering the central canal of the archyonia, is secured there by resulting cell development ; and thus fertilised the vesicle within produces the stem of the young fern.

23. Spores may be best made to germinate by broken bits of seeded pinnæ being laid on pieces of charcoal placed in a flowerpot half filled with wood-ash, pounded bricks, or earth well burnt so as to destroy other germs. The pot must be well drained, covered with a bell glass or tumbler, and kept standing in a saucer of water ; in the bath-room, if in the plains. A plate of glass does not sufficiently exclude the dry hot air, damp tolerably uniform heat being essential to germination. Young plants, as they are formed, must be removed by cutting the charcoal through beneath with a penknife, and placed in a shaded pot similarly kept damp and protected, the soil for which may be made with equal parts river sand and leaf mould (decayed leaves). Good drainage is a necessity, and small pieces of *gumlah* should be freely placed at bottom of the pots, on which shreds of old *kuskus* grass or moss may be laid beneath the earth, and the sides, as well as bottom of the pots should be bored low down. Spores may generally be shaken from paper in which fronds are kept.

24. Ferns are grouped by genera and sub-orders into an Order FILICES. The parts above described together form an individual plant or *species*, which differs from other individuals by slender shades of differentiation, yet always retains its own character and propagates itself only. Several such species are grouped into a *genus*, which holds them together by a character common to all ; genera of true ferns are similarly grouped into Tribes, and these again into Sub-orders. Naturally the Order consists of

the great division of ferns having a ringed capsule, and sometimes now called true ferns, which are ranged in two—indusiate and nonindusiate—series, and of a few additional genera grouped in four additional sub-orders of genera without this encircling ring, the capsules being sunk in a fleshy or corky receptacle. These additional sub-orders are Osmundaceæ, Schizaceæ, Marattiaceæ, and Ophioglossaceæ; the genera are few, and they are not arranged in Tribes. The true ferns have a well marked similarity between the two series, which as it were represent one another, the indusium only presenting a difference; Cyathea and Alsophila, for instance, Asplenium and Gymnogramme, Cheilanthes and Nothochlæna, &c.

25. Species appear to ally one genera in same series to another, (*Meniscium cuspedatum* and *P. urophyllum*); *D. (odont) repens* is a doubtful *Lindsaya*. These are Indian plants, and offer a good field for further observation. Light may be thrown on the true relationship of genera, by a careful study of variable ferns, whose range of variation and number are greater than was supposed, to the obliteration of several named species. A wide field is still therefore left for future observation and research in scientific pteridology.

26. Ferns are commonly spoken of by their subgeneric name, which in many cases was that of former classifications; but in writing out lists for guidance, it is better to add this last in brackets, Thus: *Nephrodium canum* a *lastræa*, should be *Nephr. (lastr.) canum*; *Diplazium*

polypodiodes as Aspl. (dipl.) polypodioides ; phlegopteris punctatum, Polypodium, or P. (phleg.) punctatum.

27. The locality of the species is mainly taken from Mrs. Lyell's useful Handbook, where will be found a ready reference to neighbouring groups, Mascarene eastward, Southern Indian to Cingalese and Malayan southward ; partly from private sources, and where possible a particular spot has been indicated from personal observation. Should this compilation prove useful, the Compiler would gladly avail himself of any special information as to localities which may be placed at his service, there being reason to suppose that this list of Himalayan species is by no means exhaustive. Private collections are often indiscriminately mingled, and not a safe guide ; even in a collection of Bojer's a foreign species added by accident was thus for a long time sought for, of course in vain, as a local Mascarene plant. But in Bargi forest, near Narkunda, several southerly ferns are reported to have been collected.

28. So many names have been given by different collectors to widely distributed species as to present a difficulty at times. Where such synonyms are likely to be locally useful, they are given.

Local names for species are too few to be of service in the Analysis. Roxburgh gives the following :—

Adiantum Cap. Ven.

Shârajinn.

Adiantum lanulatum.

Kalk'ha. *Hind.*

Ceratopteris thalictroides.	Jangli Jhau, <i>Beng.</i>
P. proliferum.	Depu, <i>Beng.</i> Kallkejanp, <i>Hind.</i>
P. quercifolium.	Goroor, <i>Beng.</i>
Hemionitis cordata.	Chacooly, <i>Beng.</i>
Lygodium pinnatifidum.	Bhootrag, <i>Beng.</i>

29. The following Analysis consists of two tables. Table first containing genera, the second species.

Table I should be studied with the aid of any ferns at hand, and the principal genera made familiar, Asplenium, Aspidium, Nephrodium, Polypodium, then Davallia and Gymnogramme, and in the southern Himalayas, Acrostichum. When a plant can at sight be assigned to one of these genera, the student will find his labor easy. Fronds should be gathered at intervals by the way, examined, and the genera determined for practise until the horseshoe shaped sori of Athyrium is not liable to be mistaken for the full kidney sorus of Nephrodium. When Table I is thus mapped out in memory so as to require only occasionally consulting, reference to the genera can be made directly to Table II, and the name of the fern under examination at once found.

30. *Abbreviations* have been freely used to save space and facilitate reference, but with the occasional full printing they need be no puzzle, as *pinfid.* for pinnatifid, *membr.*, *cor.*, for membranaceous, coriaceous, *fr.* and *segm.* —frond and segment, &c.

GLOSSARY.

Acuminate, long-pointed.
 Acute, sharp-pointed.
 Adpressed, pressed close,
 Aristate, awned.
 Articulated, jointed.
 Auricled, with appendages, eared.
 Bipinnate, twice pinnate,
 Cæspitose, tufted.
 Caudate, tailed.
 Caudex, stem,
 Circinnate, folded like a crozier.
 Concrete, massed together.
 Coriaceous, leathery.
 Crenate, marginal divisions rounded.
 Dentate, toothed.
 Dichotomous, forking in pairs.
 Digitate, divided as fingers.
 Dimorphous, of two shapes.
 Discoidal, disklike.
 Entire, without marginal divisions.
 Exserted, prolonged outside.
 Falcate, scythe-shaped.
 Flabellate, fan-shaped.
 Glabrous, smooth.
 Glaucous, with pale sea-green bloom.
 Hypogæous, underground.
 Incised, cut deeply.
 Indusium, involucre.
 Involucre, membrane covering seed.

Lanceolate, lancet-shaped.
 Lunulate, crescent-shaped.
 Mucronate, stiffpointed.
 Muricate, covered with fine points.
 Ovate, egg-shaped.
 Peltate, shield-shaped.
 Petiole, stalk of pin. *Lygodium*.
 Pinnate, with separate pinnæ.
 Pinnatifid, not cut to rachis.
 Proliferous, producing abnormal buds
 Pubescent, short haired.
 Quadri, four times.
 Rachis, midrib.
 Receptacle, in which sori rest.
 Reniform, kidney-shaped.
 Repand, margin wavy, sinuous.
 Rhizome, horizontal stem above or
 under ground.
 Scabrous, rough.
 Serrated, toothed like a saw.
 Sessile, without stalk.
 Stipe, short stem.
 Tetragonal, square.
 Tomentose, cottony.
 Tri, three times.
 Truncate, cut abruptly.
 Vernation, mode of growth.
 Villose, coated with soft hairs.

ANALYSIS OF GENERA.

GEN. 3—47.

SORI FURNISHED WITH AN INVOLUCRE.

‡ SORI GLOBOSE.

* *Dorsal.*

At or near forking of vein (*Cyatheæ*).

On vein or in axil of forking of vein.

Invol. globose covering sorus, bursting at top, and forming a cup. 4 *CYATHEA*.

Caudex arborescent, fr. ample.

On vein or veinlet.

Invol. a scale, deciduous.

5. *HEMITELIA*.

Invol. globose, hard, bursting, irregularly at top.

7 *DIACALPE*.

On back or apex of vein (*Dicksoniæ*).

Of contracted frond, quite concealed by revolute margins of pinnæ.

Invol. delicate, membranous, half cup-shaped, originating from beneath sorus. 9 *ONOCLEA*.

(Fronds dimorphous, herbaceous, large).

Invol. soft membranous, cup-shaped or globose, bursting at top, margin fringed or irregularly lobed. 11 *WOODSIA*.

(Fronds small, herbaceous, much tufted.)

Invol. globose, coriaceous, bursting vertically into two spreading lobes. 12 *SPHÆROPTERIS*.

* * *Intramarginal.*

Invol. subglobose, cup-shaped, entire or two-valved.

13 *DICKSONIA*.

(One half the species arborescent, with large coriaceous decomposed fronds: the other half with creeping rhizomes).

*** *Marginal.*

Terminating costa or vein, sunk in frond or exerted, invol. of same text. as frond, receptacle elongated.

Invol. two-lipped, toothed or fringed or entire, receptacle columnar.

(Frond small, delicately membranous).

16 HYMENOPHYLLUM.

Invol. tubular, with winged or truncated or slightly two-lipped mouth : receptacle filiform.

(Habit similar to last). 17 TRICHOMANES.

Intra or submarginal, globose or elongated either way.

Invol. terminal on veins, free at apex.

(Four types of involucre, and two distinct habits of growth. Veins free). 18 DAVALLIA.

Invol. membr. like a hood.

(Fronds small, text. thin. Veins free).

19 CYSTOPTERIS.

†† SUBGLOBOSE.

Dorsal.

Invol. orbicular, fixed by centre : sori terminal on veinlets. 43 ASPIDIUM.

Invol. reniform attached by sinus.

Sori dorsal or terminal on veinlets.

(Species numerous, differing widely in size, cutting, and venation). 44 NEPHRODIUM.

Sori at apex of upper branch of vein, generally near edge. 45 NEPHROLEPIS.

Fronds pinnate, veins free : pinnæ articulated at base, dotted (cretaceous) white on upper surface.

Sori in row near base, or below centre of compact, free veinlets. 46 OLEANDRA.

††† LINEAR.

At or near edge of frond, at apex of and uniting two or more veins.

Invol. double, opening outwardly, inner valve formed of slightly changed margin of frond.

20 LINDSAYA.

Pinnæ overridden, quadrant-shaped.

++++ LIN. OROBL.

Invol. formed of reflexed edge of frond, opening inwardly.

Sori obl. globose to linear.

(Segments onesided, text. pellucid). 21 ADIANTUM.

Sori subglobose, becoming confluent and lin.

25 CHEILANTHES.

Sori continuous linear ; connecting several veins.

Invol. pressed down reaching from edge of segment to midrib.

2 ONYCHIUM.

Sori dotlike upon veins, soon becoming confluent and linear.

(Habit of Cheilanthes ; text. coriaceous.)

30 PELLÆA

Sori lin. continuous.

31 PTERIS.

Sori filling whole space between edge and midrib, frond dimorphous.

33 LOMARIA.

Frond floated by air-cells in water.

32 CERATOPTERIS.

Sori near midrib

In parallel rows ; invol. subcoriaceous closing in sori.

36 WOODWARDIA.

In continuous line ; invol. distinct from edge of frond

33 BLECHNUM.

Sori attached to veins, obliquely to midrib : invol. when single, opening towards midrib, (Asplenieæ.)

Invol. straight or curved (Athyr.) single, Euasplenium and Darea, or double (Dipl. Anisog).

38 ASPLENIUM.

Invol. bursting irregularly down centre : sori on primary veins.

(Single species.)

39 ALLANTODIA.

Sori submarginal.

Frond flabellate. (Single species).

40 ACTINIOPTERIS.

SORI WITHOUT INVOLUCRE.—GEN. 2 and 60—48—61.

Sori on back of lobes, (to 55.)

Fr. creeping, branched or dichotomous : segm small, suborbicular or pectinate.

2 GLEICHENIA.

Fr. arborescent : sori globose, at or in forking of vein.

(Distinguished from *Cyathea* by absence of involucre).

6 ALSOPHILLA.

† *Sori not more than twice as long as broad : round, rarely obl.*

48 POLYPODIUM.

* Desmobryoid series. Stems continuous with caudex (as *Aspidium*) : sori medial on veins.

Euphleopteris Goniopteris, Dietyopteris.

** Esemobryoid series. Stems articulated to rhizome : sori (generally) terminal on veins.

Eupolypodium, Goniophlebium, Campyloneuron including *Niphobolus*, *Phymatodes* including *Drynaria* and *Dipteris*.

(The largest genus, including the above two different habits of growth, and various kinds of venation.)

†† *Sori more than twice as long as broad, usually linear.*

On veins over undersurface, simple or forked.

52 GYMNOGRAMME.

* Habit and growth of *Aspidium* : sori not forked. (*Leptogramme Stegnogramme*).

* * Habit and growth of *Cheilanthes* : sori usually forked. *Eugymnogramme* and *Ceropteris*.

Continuous on transverse veins near midrib and veins, towards edge of frond. 53 *BRAINEA*.

On connivent transverse veinlets.

54 *MENISCIUM*.

On veins imperfectly reticulated.

55 *ANTROPHYUM*.

On veins copiously reticulated, and sometimes also between them. 59 *HEMIONITIS*.

† † † *Sori in single line.*

Between edge and midrib : fr. dimorphous.

58 *DRYMOGLOSSUM*.

In margin of grasslike fr.

56 *VITTARIA*.

Marginal : obl. or roundish, soon becoming confluent and lin. : fr. matted beneath, edge frequently inflexed.

50 *NOTHOCHLÆNA*.

† † † † *Sori widespread, 60—61.*

General over under (rarely both) surfaces.

60 *ACHROSTICHUM*.

In patches on upper part of undersurface : fert. fr. stag-hornlike.

61 *PLATYCERIUM*.

Sori in separate panicles.

62 *OSMUNDA*.

„ in distichous *spikes* at apex of frond.

64 *SCHIZEA*.

„ in *spikes* or *pinnæ*, wide scandent climbing.

68 *LYGODIUM*.

SORI IN CAPSULES SUNK IN A MANY-CELLED RECEPTACLE,
OPENING BY CLEFTS.

Capsule sessiles 69—72.

Opening by cleft down side, close to one another
in boat-shaped sori, near edge of frond.

69 ANGIOPTERIS,

In raised, circular, hollowed masses, with oblong
clefts on inner face : frond like chestnut
leaf.

72 KAULFUSSIA,

Capsule deeply two-valved, opening down side nearly
to base, vernation erect.

73 OPHIOGLOSSUM,

Capsule in small crested clusters, forming a long,
loose spike.

74 HELMINTHOSTACHYS.

Capsule sessile, in two rows on face of spikes, which
form a compound panicle.

75 BOTRYCHIUM,

69, 72, 74, each a single species. 69, 75 differ
from the true ferns in the sori not being held
together by an elastic ring.

ANALYSIS OF SPECIES OF NORTHERN INDIAN FERNS.

Sub-order I.—Gleicheniaceæ.

GENERA 2.—GLEICHENIA (*f* MERTENSIA).

No. 1. Stipes (stem) forked, branched, bipinnate, (bullata
Moore, gigantea Wall). *longissima*.

Locality—Assam to Nepal. Bedd., F.B.I. 30.

2. Stipes zigzag, repeatedly dichotomous. *dichotoma*.

Locality—moist banks, Assam to Simla, Chadwick Falls,
Simla.

Sub-order II.—Polypodiaceæ.

TRIBE I. CYATHEA.—GEN. 4 CYATHEA (*Tree Ferns*).

1. *Fr.* and main rach. strongly aculeated. *spinulosa*,

Loc. Continent generally.

5. HEMITELIA (*Tree Ferns*).

1. *Fr.* 3 pinnate, *pin.* obl. lanc., *pinnl.* subsessile. *decipiens*.

Loc. Sikkim. Bedd., F.B.I., 311.

6. ALSOPHILLA (*Tree Ferns*).

f Frond 3 pinnatifid.

1. *St. and rach.* paleaceous at base, purplish brown, glossy,
prickles short, tipped with gland ; *surfaces* galbrous, glaucous
beneath : *text.* coriaceous ; *veins* once or twice forked.

(Brunoniana Wall). *contaminans*.

Loc. Assam to Naga Hills, Khasia, Mishni, Cachar, Sylhet.
Bedd., F.B.I., 85-6,

2. *St. and rach.* paleaceous ; scales pale brown ; *rach.* tawny villose above ; *fr.* yel. green, glabrous scaleless ; *veins* rarely forked ; *sori* orange colored, (unarmed). *Comosa.*

Loc. Khasia, Sylhet. Bedd., F.B.I., 84.

3. *St.* paleaceous at base, asperous ; *st. and rach.* purple ebeneous, polished ; *text.* subcoriaceous membranaceous ; *veins* pinnated, *veinlets* simple. *galbra.*

Loc. Sylhet, Nepal. Bedd. F. S. I., 60.

4. *St.* aculeate at base, muricated upwards, dark mahogany. brown ; *surfaces* upper dark green, naked, lower naked or slightly hairy and scaly ; *text.* herbaceous ; *veins* forked. *latebrosa.* (Khasyana Moore).

Loc. general. Bedd. F. S. I. 58.

5. *Rach.* dark castaneous, naked, rough beneath with raised points ; *surfaces* green with ribs densely bristly, not scaly ; *text.* firm thin ; *veins* 9—10 forked. *Andersoni.*

Loc. Sikkim 1—2,500 ft. Bedd., F.B.I., 310.

6. *Rach.* castaneous, naked and smooth beneath ; *surfaces* green, without hairs or scales ; *text.* firm ; *veins* 6—7 simple. *Scottiana.*

Loc. East Himalaya. Habit of *latebrosa*, with absence of scales on ribs below, and different venation. Figured Gard. Cho. 1872, p. 699.

(*ff Fr. tripinnate.*)

7. *Rach.* castaneous naked ; *surfaces* naked ; *veins* 8—12 forked. *Ornata.*

Loc. Sikkim. Bedd., F.B.I., 342.

7. DIACALPE.

1. *Fr.* 3 pinnate.

Aspidioides.

II.—Dicksoniæ.

9. ONOCLEA. (*ff Struthiopteris*).

Refracted margins of pin. dark purple brown. *Orientalis.*
Loc. Sikkim, 12,000 ft. Assam. Bedd. 130 & 171.

11. WOODSIA.

- * *Invol. smaller than sorus, fringed with hairs that extend beyond.*
(Euwoodsia).

Fr. glabrous ; *st. and rach.* slightly hairy. *hyperborea.*
Loc. Rotang, Himalayas. (Edgeworth).

14. *Fr.* shaggy. *lanosa.*
Loc. Sikkim, 14—16,000 ft. Kumaon 11—12,000 ft.

** *Invol. larger than sorus.* (Physematium).

2. *elongata.*

Loc. N. W. Himal. Rock. Muttiana to Hattoo near Simla.
Krande. 10,000 ft. Bedd., F.B.I., 14.

12. SPHÆROPTERIS.

1. *Fr.* 3 pinnate, 2—3 ft. l. *barbata.*
Loc. Khasia. Sikkim. Nepal.

13. DICKSONIA.

1. Arborescent. *Barometz.*
Loc. Assam. Glaucom Bedd., F.B.I., 83.

2. *Fr.* deltoid or lanc., *pinnl.* not cut to midrib ; *text.* thinly
herbaceous ; *stipe* often asperous and hairy. *scabra.*

Loc. Rock. Assam to Simla. (Chadwick falls below Bishop
Cotton School to third waterfall).

3. *Fr.* lanc. 12—18 in l., *pinnl.* cut to midrib ; *text.* herb.
appendiculata.

Loc. Nepal. Vishnu Ganga, Kumaon. Bedd., F. B. I., 82.
(Resembles *Ath. filix fem.* in habit).

III.—Hymenophylleæ.

16. HYMENOPHYLLUM.

* *Fr.* glabrous, 1—5.

Fr. bipinnatifid.

1. Pin. large lanc., with central half entire. *exsertum.*

Loc. Himal. Nepal. Bedd., F. B. I., 9.

Fr. tripinnatifid, 2—5.

† *Stem wingless.*

2. *Fr.* obl. lanc. flaccid. *microsorum.*
Loc. 11,000 ft. Sikkim. Himal., (intermediate between.
last and following).
3. *Fr.* ovate oblong. *polyanthos.*
Blumeinum Spr., F. S. I., 256.
Loc. Nepal. Sikkim. Bedd., F.S.I. 267, F.B.I. 280, 306.

†† *Stem winged.*

4. *Fr.* obl. or ovate lanc. acuminate; *st.* winged above
only. *badium.*
Loc. Nepal. Sikkim. Bedd., F. B. I., 282.
5. *Fr.* triangular, wing crisped. *Javanicum.*
(*Fimbriatum* Sm.)
Loc. Nepal. Sikkim. Bedd., F.S. I., 207 F. B. I., 180.

* * *Frond ciliated and hairy on surface.*

6. *Fr.* obl. lanc. 3 pinfid, main rach. broadly winged through-
out, and ciliated. *ciliatum.*
Loc. Sikkim. Himal. Bedd., F. B. I., 305.

* * * *Margin of frond spinuloso-dentate (Leptocionium).*

- Fr.* not crisped, more or less compound, 7—9.
7. *St.* naked, slender; *fr.* pinfid to broadly winged rach.
Simonsianum.
Loc. Khasia hills to Sikkim. Bedd., F.B.I., 281.
8. *St.* naked or tomentose; *fr.* bipinfid; *rach.* ciliated below,
winged above. *Smithii.*
Loc. Khasia. Bedd., F.B.I., 277.
9. *St.* winged upwards; *fr.* tripinfid. lanc. *flaccidum.*
Loc. Khasia. Bedd., F. B. I., 276.

17. TRICHOMANES.

* *Fr. with distinct central costa from apex to base.*

1. *Fr.* $\frac{1}{4}$ — $\frac{1}{2}$ in. l., edge minutely ciliated. *exiguum*.
Loc. Western Ind. Bedd., F. B. I., 275.

** *Fr. entire below, palmate or digitate above.*

2. *Fr.* $\frac{1}{2}$ -in. each way. *nanum*.
Loc. Assam. Khazia. Bedd. F.B.I., 286.

*** *Fr. deeply pinnatifid, main rachis not winged in lower part, 3—6.*

3. *Fr. bipinnatifid* ; *st.* strong. (*dissectum*). *auriculatum*.
Loc. Khasia hills. Above Muttiana, near Simla, found by Lord Northbrook near path over hill. Bedd. F. B. I., 182.

Fr. tripinnatifid, 4—6.

4. *Rhiz.* slender, wide creeping, 4—5.
Mouth of tube *two-lipped* ; *text.* firm. *Filicula*,
Insigne. Bedd. F. B. I., 284.

Loc. damp rocks and trees. Assam. Nepal. Kumaon. Masuri, mossy falls, and the Park. Simla, Glen and Chadwick falls. Bedd. F. B. I., 283. B. N. W. Himal.

5. Mouth of tube *broadly dilated* ; *text.* herb. *pyxidiferum*
Rhiz. wiry ; *st.* ascending.

Loc. generally as last. Khasia and below.

6. *L. pin.* and *pinnl.* ov. rhomb., cut down to narrowly-winged rach. *radicans*.

Loc. Khasia. Nepal. Rotang R, foot of Mt. Leptcha 7,350 ft. Bedd. F. B. I., 181.

**** *Main rachis quite free.*

7. *Fr.* simply pinnate, *pinnl.* not divided ; caudex tufted. *Javanicum*.
Loc. tropical Hindustan.

IV.—Davalliæ.

18. DAVALLIA.

- (1) A. *Stem articulated at point of junction with caudex.*
Esemobryoid series, 31—42.

f. Invol. coriaceous, reniform, attached by a broad base, sides and apex free.

* *Invol. ample. Humata.*

1. Barren fr., pinnatifid. *pedata.*
Loc. trees, Khasia. Sylhet southward.

** *Invol. small, narrow, thin. (Leucostegia).*

† *Rhiz. creeping, 4—7.*

2. Rhiz. *hypogæus* (underground); segm. subdimidiate.
immersa.

The only Dav. with underground rhiz.

Loc. 7—8,000 ft., shady bank and rock. Sheopore Mt. Parasnath. Landour, Jaberkaith. Simla, rock on upper path descending to glen; Chadwick falls.

3. Fr. pinnate, lanc., main rach. slightly winged above.
membranulosa.

Loc. Bhotan to Kumaon. Bedd. F. B. I., 98.

4. Fr. 2 to 3 pinnatifid lanc. subcoriaceous; rhiz. scaly, silvery brown. *Assamica.*

Loc. Assam to Bhotan. Bedd. F. B. I., 94.

5. Fr. bipinnate, ovate-delt. *multidentata.*
Thomsoni Moore.

Loc. 5—7,000 ft. Himal. of Sikkim and Nepal.

6. Fr. 3—4 pinnatifid lanc. delt. flaccid. *chærophylla.*
Pulchra Don.

Loc. 9—10,000 ft. Assam to Simla, trees and rock abundant. Kangra. Kulu. Cashmere. Bedd. F. B. I. pseudo-cystopteris, 92.

7. Fr. pinnate lanc. delt. *Clarkei.*

Doubtfully distinct from last (Hookeri Moore).

Loc. 8—19,000 ft. Khasia. Sikkim.

†† *Fronde tufted.*

8. *Fr.* 4 pinnate, broadly ovate, 2—4 ft. l.; *text.* herb. *nodosa.*

Loc. 7—10,000 ft. Sikkim. Bedd. F. B. I., 93.

9. *Caudex* erect; *st.* grey stramineous, slightly scaly; *fr.* deltoid, 1—2 ft. l. 4 *pinnatifid*; *surfaces* green with scattered subulate scales; *text.* membr. *setosa.*

Loc. East Himalayas. Near Simla (?), Bedd. F. B. I., 262, *Lactrea* and *Cystopteris*, 312.

*** *Invol.* as last, becoming confluent; *pinn.* pellucid, herbaceous, dimidiate. (*Odontoloma*).

10. *Fr.* pinnate. *repens.*

Loc. inside hollow rotten trunks, &c. Brahmakund. Assam. Khasia.

ff. *Invol.* coriaceous, attached at sides as well as base, half cupshaped. (*Eudavallia*.)

* *Fr.* ample deltoid, tri or quadri-pinnatifid, coriaceous.

11. *Fr.* 3 pinfid., 2—3 ft. l., sori at some distance from edge obliquely to central veins. *divaricata.*

Loc. Khasia. Mishmi. Bedd. F. B. I., 107.

12. *Fr.* 3—4 pinfid., 1 ft. l. or less; sori large, broadly cupshaped. *Griffithiana.*

Loc. Himal. of Assam. Khasia. Bhotan. Bedd. F. B. I., 106.

13. *Fr.* 4 pinfid., sori with horns outside. *bullata.*

Loc. Assam. Nepal, 3—4,000 ft. Bedd. F. S. I., 17.

B. STEMS CONTINUOUS WITH CAUDEX. (*Desmobryoid series*) 14—21.

fff *Invol.* membranaceous, attached at sides as well as base, shallowly, half cup-shaped. (*Microlepis*).

Rhiz. wide creeping, 14—17.

Fr. pinnate 14—15.

14. *Fr.* truncate and auricled above; toothed. *Hookeriana.*

Loc. Assam. Khasia. Sylhet. Kumaon. Bedd. F. B. I., 101

15. *Fr.* bluntly lobed half way or less to rach. *marginalis*.
 Loc. Khasia. Nepal. Kumaon (*Villosa Calvescens* Wall).
 Bedd. F. B. I., 102.

Fr. bipinnatifid.

16. *St.* and *rach.* and prominent veins beneath, pubescent.
strigosa.
 Loc. Khasia. Himal. 3--5,000 ft.; similar to last in habit.
 Bedd. F. S. I., 255.

Fr. tripinnatifid.

17. *Pinnl.* cut nearly to rach. below. *platyphylla*.
 Loc. Khasia. Bhotan. Kumaon. Bargi forest, Narkunda.
 near Simla? Bedd. F. S. I., 12.

18. *St.* strong erect; *pinnl.* cut down to rach. below.
caudigera Moore. *urophylla*.

Loc. Khasia. Bhotan. Kumaon. Bedd. F. B. I., 103.

Fr. 3--4 *pinnatifid*: *deltoid*.

19. *St.* strong erect; *text.* coriaceous. *hirta*.
 Loc. Nepal. Simla (?). Bedd. F. S. I., 256.

Habit of next, combined with *text.*, and prominent venation
 of *strigosa*.

20. *St.* erect; *text.* herbaceous; fr. 3--6 ft. l., 12--24 in. br.
Speluncæ.

Loc. shady marsh, 1--7,000 ft. Assam. Nepal.

ffff Invol. forming compressed suborbicular or cup-shaped
 pouch, terminal on segment, and open only at top.

* *Ult. segm. cuneate.* (*Stenoloma*).

21. *Fr.* 4 pinfid, upper surface shining. *tenuifolia*.
Chinensis I. Sm.

Loc. Himal. 5,000 ft. Assam. Khasia. Sylhet. Nepal.
 Simla, below Cotton's school, on damp rock.

19. CYSTOPTERIS.

1. *Fr.* 3 pinfid. ov. lanc. *fragilis*.

Loc. Afghanistan. Himal. to 15,000 ft. Nepal. Kulu.
 Kangra. Simla. Punjab. Bedd. F. B. I., 91.

V.—Lindsayæ.

20. LINDSAYA.

f Pinnæ unilateral, veins free. (Eulindsaya). (Habit of Adiantum.)

* *Main rachis not branched.*

1. *Rhiz.* short creeping, *st.* flexuose ; *text.* coriaceo-membr. *cultrata.*

Loc. Himal. to 4,000 ft. Assam. Khasia. Nepal. Bedd. F. S. I., 23.

2. *Rhiz.* wide creeping ; *st.* erect ; *text.* pellucid. *pectinata.*
Habit of *Daval. repens.*

Loc. Assam.

* * *Main rachis branched.*

3. *St.* wiry, blackish, polished. *flabellulata.*
Loc. N. Hindustan. Bedd. F. S. I., 216.

ff Pinnæ equilateral ; veins anastomosing. Fronds entire or pinnate, not pellucid. (Schizoloma.)

* *Fruit in continuous line along both margins.*

4. *Fr.* pinnate below. *ensifolia.*
Loc. Himal. to 4,000 ft. Khasia. Bedd. F. B. I., 29.

VI.—Pterideæ.

21. ADIANTUM.

f Veins free. (Euadiantum) to 6.

* *Frond simply pinnate. rachis often elongated and rooting at apex. (Radicantes group).*

1. *St.*, *rach.* and *surfaces* naked ; *text.* herb. *lunulatum.*

Loc. Himal. to 4,000 ft. on banks. Assam. Sylhet. Nepal. Kumaon. Rajpore. Kalka, 3 miles up roads. Banda. Calcutta.

2. *St.* tomentose, *rach.* and *surfaces* villose ; *text.* coriaceous. *caudatum.*

B var. *Edgworthii*, *text.* membr., *surf.* glabr., *pin.* subentire.

Loc. dry banks and rocky crevices. Himal. to 6,000 ft. Assam to Simla abundant on roadside above *Caudatum*. Multan and Scinde. *B.* shade, Bedd, F. S. I., 17.

* * *Frond* more than once pinnate, segments flabellate-cuneate, with petiole near centre ; sori obversely reniform. (Capillus Veneris group).

3. Lowest *pin.* branched ; edge of *segm.* rounded, deeply lobed, lobes contracted. *Capillus Veneris.*

Loc. wet rock. Himal. to 6,000 feet. Assam to Simla, and in wells throughout plains.

4. Lowest *pin.* deltoid, edge of *segm.* rounded, irregularly, sometimes broadly lobed and finely toothed. *venustum.*

Loc. shady banks, 7—8,000 ft. Assam. Khasia. Nepal. Masuri. Simla. Mirat.

(More coriaceous in *text.* than last).

* * * *Fr.* dichotomously forked, with numerous *pin.*, springing from upper side of each of two branches. (Pedatum group).

5. *Text.* pellucido-herb. ; *pinnl.* broadest next stem, lobed sometimes 1-3rd down, lowest shortly stalked *pedatum.*

(Main forks 4—6 branched from upper side, central largest)

Loc. Jumnotri. Gurhwal. Kangra. Kumaon. Hattoo, near Simla, found by Captain Biddulph.

6. *Text.* coriaceous ; *pinnl.* entire or slightly toothed, lower edge nearly straight, upper rounded, outer blunt. *flabellulatum.*

Loc. Assam. Khasia. Nepal. Kumaon. Bedd. F. S. I., 218.

25. CHEILANTHES (*ff Eucheilanthes*).*f Segments large and flat 1—5.*

1. *St. densely scaly throughout.* *fragrans.*
 Loc. N. W. Himal., 5,000 ft.

* *St. polished 2—6.*

2. *Fr. 2 pinfid, lanc., surface naked, text. herb.* *varians.*
 Maderensis Lowe.

Loc. 2—3,000 ft. Assam. Khasia. Sylhet. Bedd. F. S. I., 189
Fr. 3 pinfid 3—5.

3. *Fr. ov. lanc., rach. slightly pubescent, lower surface only*
villose, especially on costa, invol. greenish. *subvillosa.*

Loc. Simla, 2 miles above Thiou, to Pabur Valley, Himalayas.
 Bedd. F. B. I., 142.

4. *Fr. subdeltoid, rach. and costa naked and glossy like*
stipe, surfaces naked. Invol. crowded, young fronds often fari-
nose beneath. Hattoo. *Dalhousiæ.*

Loc. Simla to Kumaon to 10,000 ft. Denudate variety of
farinosa. Bedd. F. S. I., 193. This and last differ from the rest
 in their broader *segm.* and more herbaceous texture.

5. *Fr. deltoid, rach. polished like stipe, surfaces green and*
naked, invol. brownish, toothed. *tenuifolia.*

Loc. sub-tropical Himal. Assam. Khasia. Bedd. F. S. I., 188

ff Segments very small, beadlike (Physapteris).

6. *Szovitzii.*

Loc. rocks. Indus Valley, 7—8,000 ft. Scinde. Chahil
 Tan, Kashmir. N. W. Thibet 8,500 ft. Kulu. Bedd. F. B. I., 145.

fff Frond coated beneath with white or yellow powder.
 (Aleuropteris).

* * *St. densely tomentose.*

7. *rufa.*

Loc. Simla to 4,000 ft. Mishmi. Nepal. Khasia. Bedd.
 F. B. I., 144.

8. *Fr.* delt. 3—4 in. l., 2—3 pinfid.; *st.* polished; powder white, ceraceous. *argentea.*

Powder yellow, var. *B Chrysophylla.*

Loc. wet rocks, 5—6,000 ft. Khalapani, Khasia. Bedd. F. B. I., 133.

9. *Fr.* deltoid or lanc., powder pure white. *farinosa.*

(Much larger than last, and doubtfully distinct from *Dalhousiæ*). Bedd. F. S. I., 191.

Loc. exposed rock to 7,000 ft. Assam to Simla. Hattoo. 9,000 ft. Around Masuri and Simla replaced by *Dalhousiæ* form above 5,000 ft.

27. ONYCHIUM.

1. *Invol.* and sori golden. *auratum.*

Loc. to 5,000 ft. Nepal. Bhotan. Khasia. Kaladonghi, below Naini Tal. Simla (?) Bedd. F. S. I., 30.

Invol. and sori brown. *japonicum.*

Loc. to 10,000 ft. Sikkim to Simla. Bedd. F. B. I., 21.

29. CRYPTOGRAMME.

1. *St.* tufted, fert. segm. podshaped. *crispa.*

B var. *Brunoniana* Wall, fert. segm. obl.

Loc. Himal. 10—15,000 ft. Balti. Chor Mt., and Hattoo among *Woodsia* Simla, 9,000 ft. Kumaon, 14,000 ft. Shayuk Valley, 9,000 ft. Sikkim, 11—13,000 ft. Choonjerma Pass. *B* Sikkim, 13,000 ft. Bedd. F. B. I., 164.

30. PELLÆA.

f *Text.* herbaceous or subcoriaceous; veins distinct; invol. broad. (*Cheiroplecton*).

1. *Fr.* ovate lanc., 2—3 pinfid.; *st.* not tufted, fert. fr. contracted. *gracilis.*

Loc. Kumaon. Chumba. Himal. of Thibet, 9—10,000 ft.
(more delicate in text. than *Crypt. crispa*). Bedd. F. B. I., 73.

2. *Fr.* deltoid, 3 principal pinnæ. *Tamburi.*

Loc. Tambur Valley, East Nepal.

ff Text. coriaceous; veins indistinct.

† *Invol. broad, conspicuous.* (Allosorus.)

3. *Fr.* 2—3 pinfid. *nitidula.*

Loc. rock to 6,000 ft. Simla. Kumaon. Karli. Pund-
hester. Kulu. Bedd. F. B. I., 222.

†† *Invol. narrow, sori hidden.* (Platyloma.)

4. Both surfaces glaucous green. *calomelanos.*

Loc. exposed rocky banks, to 6,000 ft. Simla. Kumaon.
Karli. Bedd. F. B. I., 22.

31. PTERIS.

f. Veins free, 1—12.

‡ *Stems caespitose, invol. single, to 11.*

* *Lower pinnæ linear, entire.*

1. *Fr.* obl. lanc. *longifolia.*

Loc. to 4,000 ft., common, Himal. and plains. Masauri,
Camptie falls, Murray's falls. Simla, Prospect Hill S. Road
sides above Kalka.

* * *Lower pinnæ forked, with a long lin. entire point.*

2. *St.* polished, bar. *pin.* edge serrated, fert. narrower; *invol*
pale. *Cretica.*

B var. stenophylla, *pin.* 3—5, clustered at apex, edge entire,
all same breadth, and mostly fert.

Loc. Himal. to 9,000 ft., common, *B.* dry banks, Masauri.
Bedd. F. S. I., 39.

3. Lowest pinnæ only occasionally forked, both surfaces
bright green glossy. *pellucida.*

Not satisfactorily distinct from former.

Loc. Assam to Mishmi and Nepal.

4. *Pin.* arising from near same point, lin. slightly serrated ;
veins conspicuous, 1 line apart at base. *dactylina.*

(Habit of *Stenophylla*, with different venation.)

Loc. dry sheltered rock. East Nepal. Sikkim. Khasia to
9,000 ft. Bedd. F. B. I., 23.

5. *Fert. pin.* compound ; lower barren pin. subdeltoid, cut
down to rach. below into 4—6 ovate obl. slightly toothed pin.
ensiformis.

Bar. fr. of present *fert.* of next group. *Crenata* Sw.

Loc. Assam. Khasia. Goalpara. Sylhet. Terra Ghut, below
Darjeeling. Bedd. F. S. I., 35.

* * * *Lowest pinna pinnate.* (pinnatæ.)

6. *Fr.* 2—3 in. broad. *Griffithii.*

Loc. Assam. Mishmi. Bedd. F. B. I., 24.

7. *Fr.* 6—9 in. broad. *semipinnata.*

Loc. Khasia. Sylhet, 3—4,000 ft. Simla, (Bargi ?) Bedd.
F. S. I., 34.

* * * * *Lowest pinnæ at base pinnatifid.* (*Bipartitæ.*)

Fr. with terminal and similar lateral pindæ.

Fr. 3 ft. or less 1.

8. *Lobes* entire or serrated, lin. obl. ; lowest *pin.* usually
branched at base ; *sori* often continuous to apex. *quadriaurita.*

Loc. 3—11,000 ft. generally throughout tropics.

9. *Lobes* entire, blunt, caudate ; lowest *pin.* sometimes forked,
sori continuous nearly to apex. *longipinnula.*

(Very doubtfully distinct from preceding.)

Loc. Assam. Khasia, 2—3,000 ft. Sylhet. Bhotan. Sikkim,
2—4,000 ft. Nepal. Simla. Bedd. F. S. I., 43.

Fr. 5—6 ft. 1.

10. *Lobes* lin-falcate decurrent ; *st.* glossy, *sori* not reaching
to apex. *excelsa.*

(Like quadriaurita on a large scale.)

Loc. Sylhet. Nepal. Kumaon. Gharwal, 7—8,000 ft.
Simla, Chadwick falls, and Mashobra. Bedd. F. B. I., 218.

* * * * * *Lowest pinnæ much the largest, often nearly
equalling central portion of frond. (Tripartitæ.)*

11. *Text.* herb., costa of pinnules sometimes spinulose.
pellucens.

Loc. hills of Assam, Khasia, and Sikkim. Bedd. F. S. I., 32.

† † *Rhizome creeping; stems subdistant; involucre
more or less distinctly double. (Poesia.)*

12. *Fr.* subdeltoid. *aquilina.*

Loc. Himla., 2—9,000 ft.—general.

*f f Veins of last division but one connected by arching
veins at very base. (Campteria.)*

13. *Fr.* with term. and lat. pin. cut down nearly to rachis
into lin. obl. lobes, lowest usually forked, veins prominent.
biaurita.

(Possibly only a Campteroid form of *quadriaurita*.)

Loc. Assam. Khasia. Sikkim, 1—4,000 ft. Nepal. Kumaon.
Simla. Parasnath.

14. *Fr. tripartite*, with lat. forked divisions nearly as large
as terminal one, veins not conspicuous. *Wallichiana.*
umbrosa Wall.

(This again may be a Campteroid form of *Tripartita*.)

Loc. Sikkim. Gharwal. Kumaon. Kangra in Kulu to
8,000 ft. Bedd, F. B. I., 217.

f f f Veins copiously anastomosing. (Litobrachia.)

15. *Fr.* bipinnate, bluish green, often glaucous. *incisa.*

Loc. marshy ground, borders of forests. Khasia. Sikkim.

16. *Fr.* tripartite. *tripartita.*

Loc. near water. Sylhet.

32. CERATOPTERIS.

1. St. aircelled. *thalictroides*.
 Loc. pools. Punjab. Kulu. Rohilkund. Burdwan.

33. LOMARIA.

f Base of stipe suddenly dilated, fleshy, triquetrous, 1 furnished with large spongy glands. (Plagiogyria.)

* Central pinnæ of barren fr. narrowed at base, and distinct from one another.

2. Under surface silvery white. *glauca*.

Loc. Khasia, 6,000 ft. Bedd. F. B. I., 90.

3. Pin. numerous, contiguous, veins inconspicuous. (Gland often at base of pin.) *pyncnophylla*.

Loc. Assam. Bhotan. Khasia to Nepal, 7—10,000 ft. Bedd. F. B. I., 52.

4. Pin. 1 in. or more apart at base, linear, erectopatent, veins prominent. *euphlebia*.

(Less coriaceous, pin. less numerous and more distant than last, venation less fine.)

Loc. Assam. Khasia. Nepal (temp. reg), 6,000 ft. Bedd. F. B. I., 165.

34. BLECHNUM.

1. * *Fr. pinifid.* *nitidum*.

Loc. Assam. Mishmi. Bedd. F. B. I., 49.

- * * *Fr. pinnate.*

2. Pin. lin. obl., finely incised, veins fine *serrulata*.

Loc. marshes—Mishmi.

3. Pin. lin. entire bases distinct, upper decurrent, lowest mere auricles, veins fine. *orientale*.

Loc. 4,500 ft. Nepal. Sikkim. Sylhet. Khasia.

4. Pin. lin., falcate entire, upper adnate, those below centre distinct, veins in large areolæ. Cuticle of undersurface loose and wrinkled. *Melanopus*.

Loc. Khasia hills. Bedd. F. B. I., 50.

- (1) 3 angled with faces hollowed.

36. WOODWARDIA.

1. Veins forming at least one series of areolæ between sori and margin. *radicans.*

Loc. generally on rock near water, Himal., 4—6,000 ft. Simla. Masauri. Kangra in Kulu. Bedd. F. B. I., 88. Brown *gemmæ* (leafbuds) usually at base of upper pinnæ, from which it may be grown.

VIII—Aspleniæ.

38. ASPLENIUM.

f. Fronds undivided. Veins connected at apex by transverse intramarginal line. (Thamnopteris.)

1. Sori reaching half way to margin, fr. 2 ft. or more l. *Phyllitidis* Don. *Nidus.*

Loc. trees in damp forests. Himal. Assam. Bedd. F. B. I., 197.

Sori reaching nearly to edge; fr. less than 2 ft. l.

2. Fr. lanc. spatulate narrowed suddenly below to winged stipe, midrib keeled. *Grevillei.*

Loc. Mishmi. Bedd. F. B. I., 66.

3. Fr. acuminate above, tapering to short stem below, midrib rounded. *Simonsianum.*

Loc. Khasia. Unker hills. Bedd. F. B. I., 248.

Two last little known, and perhaps not really distinct from *Nidus.*

ff Veins free, single or branched; sori linear or lin. obl. straight, discoidal. (Euasplenium.)

* *Frond quite entire.*

4. Edge entire. *ensiforme.*

B stenophyllum, fr. very narrow.

Loc. Trees and rock Himal. 7 to 10,000 ft. Assam. Nepal. Sikkim to Masauri and Simla. B Bedd. F. B. I., 147.

5. Edge crenate. *Griffithianum*.
 Loc. Assam. Mishmi. Sikkim below Darjeeling, to 4,000
 ft. Bedd. F. B. I., 58.

* * *Frond lobed*.

6. Lanc. obl. *alternans*.
 Loc. Himal. to 6,000 ft. Kumaon to Simla. Chumbra hills.
 Bedd. F. B. I., 59.

Venation not compound as in *ceterach*, otherwise similar.

* * * *Frond pinnate*, 7—14.

† *Pin.* $\frac{1}{4}$ — $\frac{1}{2}$ in. broad blunt.

7. *Rach.* green, slender. *viride*.
 Loc. Himal. to 12,000 ft. Glacier of Pindari. Kumaon.
 Bedd. F. B. I., 64.

Rach. wiry, polished.

8. St. 1—4 in. l., densely tufted, with rach. chestnut brown,
 pin. sessile. *Trichomanes*.

Loc. Damp banks and rock. Himal., 6—13,000 ft. Ladakh.
 Kashmir. Simla to Kumaon. Bhotan.

9. St. 4—6 in. l., with rach. blackish, pin. auricled on upper
 side, lower deflexed. *normale*.

10. † † *Pinnæ* 1—3 lin. cuneate. *septentrionale*.
 Loc. Gharwal. 11,000 ft. Kashmir, 9,000 ft. Bedd. F. B. I.,
 60.

† † † *Pinnæ* numerous, lin. or lin. obl. usually
 ample, acute or acuminate, narrowed
 suddenly at base on upper side, inner
 edge nearly parallel with main rachis,
 lower side obliquely truncate. 11—14.

A *Sori* and veins long, irregular, subflabellate, very oblique.
 (Falcatum group.)

11. Pin. numerous lobed, sometimes more than half way
 to villose rach., and deeply toothed; the sides unequal, upper
 auricled; st. fibrillose. *Caudatum*.

Loc. Khasia. Bedd. F. S. I., 143.

12. Pin. opposite stalked, sharply serrated; the two sides nearly equal, st. and rach. naked. *macrophyllum*.

Loc. Assam. Bedd. F. S. I., 142. (Pin. few, larger, text. less coriaceous than last.)

B *Pinnæ with from half to whole of lower side cut away.*
(Resectum group.)

13. St. slender, with rach. polished dark chestnut or grey opaque, pin. subsessile, almost dimidiate. *resectum*. —

Loc. wet rocky crevices to 8,000 feet. Khasia. Bhotan, Sikkim. Nepal. Simla, 2nd waterfall and Chadwick falls, each on left side.

14. St. firm, and rachis chestnut, pin. dimidiate. *heterocarpum*. —

(Upper edge more deeply incised than last, and resembling a dimidiate *Adiantum*.)

Loc. Khasia. Nepal. Simla. Bedd. F. S. I., 131.

**** *Pinnæ cut down at any rate in lower part, nearly or quite to rachis.*

15. Pin. lobed half way or more, and deeply inciso-serrate. *planicaule*. —

Loc. Trees and rock. Khasia, 4—6,000 ft. Sikkim, Nepal. Kumaon, Gurhwal. Masauri. Simla. —

16. Pin. cut down nearly or quite to rach. below into stalked lobes. *laciniatum*.

Loc. Assam to Nepal. Duphla hills. Simla (?) Bedd. F. S. I. 145.

***** *Fronds bi to quadri-pinnate.*

† *Venation subflabellate* 17—21.

A *Text. coriaceous. Ultimate divisions of frond lin. or ovate-cuneate, often shining on upper surface.* (Cuneatum group.)

17. *Fr.* 1—2 in. l., deltoid. *Rutamuraria*. —

Loc. exposed rock. Kashmir Bedd. F. B. I., 61.

Fr. under 1½ ft. l. coriaceous.

18. St. and rach. chestnut polished, winged and compressed above, lower pin. deltoid; sori occupying whole surface. *adiantum nigrum*. —

Loc. Simla to Masauri. Kashmir. Afghanistan. Bedd. F. B. I., 62.

19. St. and rach. deciduously clothed with woolly hairs; pin-lanc.-delt., sori radiant linear. *furcatum.*

Loc. Assam.

Fr. 2 ft. or more l.; st. naked.

20. Text. sub-coriac., pin. lanc.-delt., sori radiant short. piunl. ample, rhomboidal, shining. *nitidum.*

Loc. Assam. Sylhet. Bargi forest, beyond Simla.

21. Text. herb., pin. lowest delt.-lanc; sori short, lin. obl. irregular. *laserpitifolium.*

Fripinnatum Roxb.

Loc. Assam.

† *Venation* pinnate, 22—25.

B *Text.* herb. or slightly coriac., *fr.* 4—9 in. l. lanc.

(*Lanceolatum* group.)

22. Lower pin. subdelroid, cut down to rach. into cuneate; flabellate pinnules. *varians.*

Loc. damp rock, 6—8,000 ft. Simla to Masauri. Bhotan. Lachung R. in Sikkim.

23. *B. exiguum*: Bedd: Lower pin. short reflexed, pinnl. stalked. *fontanum.*

Loc. Himalayas. B. Simla on glen just below elbow of road to Annandale; rock on roadside beyond Thiog. Bedd. F. B. I., 146.

C *Fr.* 1 ft. or more l. *Ultimate divisions* ample. *Text.* herbaceous. (*Bulbiferum* group.)

24. *Fr.* obl. deltoid. *bulbiferum.*

Loc. Nepal. Sikkim. Bhotan. Bedd. F. B. I., 65.

D *Fron*d 1 ft. or less l., bright green. *Ultimate divisions* firmly cut, *text.* thinly herb. (*Cicutarium* group.)

25. *Fr.* obl. lanc. *tenuifolium.*

Loc. Simla, Glen. Khasia. Sikkim. Nepal. Bedd. F. S. I. 130.

fff *Veins* simple, *ultimate divisions* of frond narrowly lin., *sori* lin. or lid. obl. marginal or submarginal. (*Darea.*)

fff Veins simple, ultimate divisions of frond narrowly
lin; sori lin. or lin. obl, marginal or submarginal.
Darea.

26. Fr. 6—15 in l, pale green, rach. compressed.
rutæfolium.

Loc. Mishmi. Khasia. Bhotan.

The only Dareoid Asplenium yet found in India.

fff Veins free, sori curved, or horseshoe-shaped. (Ath-
yrium).

† Fr. deltoid.

27. Fr. 1 ft. each way, 4 pinfid. *subtriangulare*.

Loc. 10—12,000 ft. Sikkim. Bedd. F. B. I., 242.

†† Fr. lanc. or ovate lanc.

Fr. 2 pinnatifid, herbaceous.

28. St. tufted, densely scaly, fr. ov. lanc. 6—9 in l.
Hohenackerianum.

Loc. Scinde. Simla (Chadwick falls). Bedd. F. S. I., 150.

29. St. polished, fr. lanc. 1—2 ft. l, rach. broadly winged
pinnl. ellipt., nearly entire. *Thelypteroides*.

a allantoides, pinnl. inciso-dentate, sori obl. Bedd. F. B. I.
221.

Loc. North-west above Simla. Narkunda. a. East Hima-
laya. Dalhousie. 9—10,000 ft, Bedd. F. B. I., 68.

Distinguishable by its long sori in regular rows.

Frond 2—3 pinnatifid. (30—35.)

30. St. naked: fr. lin. lanc. $1\frac{1}{2}$ — $2\frac{1}{2}$ ft. l.; pinn. num. lower
dwarfed; pinnl. falcate segmented $\frac{1}{3}$ — $\frac{1}{2}$ down. *Clarkei*.

(A few sori double but separate at apex.)

Loc. Sikkim, Rupait, 9,000 ft. Bedd. F. B. I., 360.

31. Fr. 6—12 in l. bipinfid, lanc.; pin. lanc. blunt, sessile
bluntly lobed; lower distant, lowest produced above; rach. winged
in upper half; text. mod. firm; sori obl. oblique in regular row
near midrib. *drepanophyllum*.

Loc. Penins. India. Bedd. F. S. I., 151.

Frond ovate lanceolate, herb. (31—33), pinnules elliptic-rhomboidal. 12—24 in. l. (30—32.)

32. *Pin.* cut to rach. into inciso-crenate or pinfid *pinnl.*, sori copious large. *macrocarpum.*

a membranacea. Arnot.

b Atkinsoni, fr. membr. 3—4 in. l., lanc. 2 pinfid.

Loc. Sikkim. Khasia Upper Assam to Simla. 5—7,000 ft. Habit of *Lastr. Spinulosa*; invol. nearly reniform, but colour yel. green. B. Sikkim, Bedd. F. S. I., 152, ordinary dwarf form F. B. I. 359.

33. *Pin.* cut to rach. into ellipt. rhomb., *pinnl.* broadly lobed halfway down, and slightly toothed. *St.* often pink. much tufted, rather spinulose above; sori in parallel rows close to midrib.

nigripes.

Loc. Himalayas to 6,000 ft. (or 10,000 ft.) Simla, Glen and Chadwick falls, and below Chota Simla. Bedd. F. S. I., 157.

Frond lanceolate, text. subcoriaceous.

34. *Pinnl.* lanc., sometimes auricled above, or again pinfid; teeth mucronate; *midrib spinulose above.* *oxyphyllum.*

L. Eburnea I. Sm.

Loc. Assam. Khasia. Bhotan. Nepal. Masauri to Simla to 7,000 ft. Bedd. F. B. I., 67.

Very delicate, and one of the most beautiful Ind. sp.

35. *Fr.* obl. lanc., 1—3 ft. l., *rachis* winged compressed, *pinnl.* ovate or rhomb. deeply incised. *Text.* thin, *st.* tufted.

Filix femina.

(*pectinatum*, *tenuifrons*, *tenellum* Wall.)

Loc. Simla. Naini Tal to Bhotan 10—12,000 ft. Masauri.

36. *Fr.* ov. lanc. 2—3 ft. l., lower pin. 1 ft. or more; *pinnl.* distant with lanc., *segm.* deeply sharply toothed; sori small in two rows near midrib. *brevisorum.*

(Lower sori often double.)

Loc. Mishmi. Bedd. F. B. I., 241.

Fr. tripinnatifid.

37. *Fr.* 2—4 ft. l., *pinnl.* lanc., *segm.* subdeltoid stalked, deeply pinnatifid with mucronate teeth. *fimbriatum.*

Loc. Simla. Kumaon. Nepal. Sikkim, 8—9,000. Bedd. F. B. I., 295.

Fr. 3—5 ft., *pin.* ov. lanc. cut to rachis into unequalsided ellipt. rhomboid, deeply crenate lobes, colour bright green.

umbrosum.

a Australe. R. Br. *fr.* 3. *pinfid.* ult. *segm.* broader, and sori longer than type.

b Multicaudatum Wall. *D Jerdoni.* Bedd. F. B. I., 327, *fr.* 4 *pinfid.* ult.; *segm.* lig. toothed, containing several short sori.

c Procerum Wall: *fr.* 4 pinnate, ult. lobes blunt entire, with single sorus at base.

d Griffithii, Bedd, F. B. I., 328, No. 44 p. 30 possibly a fourth variety.

Loc. Nepal. Sikkim. 6—8,000 ft. frequent. Bedd. F. S. I., 158.

ffff Veins free, sori and involucres extending to both sides of some of them. (Diplazium.)

38. Frond simple, entire. *lanceum*

Loc. Himal. Khasia. Nepal.

* * *Fr.* with lower part half or three quarters pinnate.

† *Pinnæ* entire, or very slightly lobed.

39: Sori short of edge, deltoid lobed apex, and sharply toothed *pinnæ*. *pinnatifido-pinnatum.*

Loc. Mishmi. Bedd. F. B. I. 244.

40. Sori from midrib to edge, terminal and lat., *pinnæ* nearly entire, ends narrowed. *bantamense.*

(*fraxinifolium* Wall.)

Loc. Assam. Khasia. Bedd. F. B. I., 69.

† † *Pinnæ* lobed from half to two-thirds down to rachis, in lower part.

41. Rhizome creeping, colour bright green. *Japonicum*

Loc. North-West Provinces. Nepal. Simla, Chadwick falls, Bedd. F. B. I., 292.

42. *St.* tufted densely fibrillose below, pin. cut $\frac{2}{3}$ rds into blunt spreading lobes. *sorzogonense*.

Loc. Sikkim, 8—10,000 ft. Bedd. F. B. I., 246.

43. *St.* and rach. tomentose firm subcoriaceous *tomentosum*.

Loc. Khasia. Bedd. F. B. I., 195. *fr.* 12—18 in *l.* 4.

44. *St.* slender, scaly below pinfid apex; pin. falcate, lower ones stalked. —6 in br. *longifolium*.

(*Lobulosum* Wall.)

Loc. 5—6,000 ft. Nepal to Simla (Chadwick falls. Glen), Masauri (Mossy falls) on damp rock. Bedd. F. B. I., 247.

45. *St.* and rach. glabr. *fr.* 10 in br. pin. cut $\frac{2}{3}$ rds down. *Steliczkae*.

(Near *Sorzogonense* with broader pinnl.)

Loc. Himal. Bedd. F. B. I., 360.

* * * *Fronde* copiously bipinnate.

† *Fr.* less than 2 ft. *l.*, *text.* subcoriaceous.

46. *Fr.* nearly as broad as long; sori obl. on each (6) vein reaching from costa nearly $\frac{1}{2}$ way to edge. *Griffithii*.

Differs from next mainly in sori, and see note to *umbrosum* No. 37, ante p. 28.

Loc. Mishmi. Assam. Bedd. F. B. I., 328.

†† *Fr.* Ample, *text.* herbaceous.

47. Caudex subarborescent, densely fibrillose at crown; *st.* not scaly, densely tufted and muricated; *pin.* 8—9 on each side; *pinnl.* cut nearly to rachis into lin. obl. slightly toothed lobes; sori fall short of edge.

A frondosum Wall.

polypodioides.

Loc. Near water, common to 8,000 ft. Khasia, Bhotan Sikkim, Kumaon, Simla, Kashmir, Bedd. F. S. I., 163. F. B. I., 293.

48. Caud. woody, St. stout 2 ft. or more l. fr. very l. tripin. below, with deeply pinfid pinnl.

dilatatum Bl.

latifolium.

(Distinct from *sylvaticum* ? Bedd.)

Loc.? India. Bedd. F. S. I., 162.

ffffff Veins anastomosing; sori as in *Diplazium*.
(*Anisogonium*.)

† *Fronde* pinnate.

49. St. scaly throughout, fr. 12—18 in l., apex pinfid, text thinly herb. *heterophlebium*

Loc. Assam, Mishmi, Bedd. F. B. I., 329.

50. St. strong often muricated, pin. often proliferous in axils.
decussatum.

Loc. Himal, Bedd. F. B. I., 70.

†† *Fronde* bipinnate.

51. Caud. subarborescent, fr. ample, text. subcoriaceous. rach, often pubescent. *esculentum*.

Bipinnatum Roxb. malabaricum sprengl.

Fr. sometimes only pinnate. See ante 36, p. 29.

Loc. Kumaon southwards, Bedd. F. S. I., 164.

fffffff Veins anastomosing towards margin. (Hemidictyum.)

52. St. densely tufted, wiry ebeneous, chaffy: fr. 4—6 in l. lobed nearly or quite to rach *Ceterach*.

Differs in *venation* from *alternans*; invol. disappears early.

Loc. Himal. Kashmir. Bedd. F. B. I., 71.

53. St. green, compressed, nearly naked: fr. pinnate (Asplenidictyon. J Sm.) *Finlaysonianum*.

Loc. Assam, Khasia, Gowhatti, Mishmi, Nepal, Sikkim, Kumaon, Simla. Bedd. F. B. I., 72.

39 ALLANTODIA.

1. *Fr.* pinnate.*Brunonianæ.*

Differs from (*Aspl. hemidictyum*) by invol. bursting in *irregular line down centre.*

Loc. to 6,000 ft. Assam, Sikkim, Nepal, Sheopur Mt. Bedd. F. B. I., 159.

40 ACTINIOPTERIS.

1. *Fr.* flabellate.*radiata.*

Like miniature palm tree (*Chamærops*) sori between *Asplenium* and *Pteris*.

Beng. Morpankha.

Loc. Sinde, Moradabad. Old wall, foot of limestone hills. Agra. Morar. Wells near Meerut, Saharunpore and Delhi and along Jumna. Royle.

X. ASPIDIAE.

43 ASPIDIUM.

f Veins free. *Text.* coriaceous [except Sikkimense].
teeth usually awned.

Polystichum.• *Fr.* once primate.† *St.* densely tufted.1. *St.* ebeneous above, scaly below.

Fr. 12—18 in l. pin. ov. rhomb, subfalcate unequal, point mucronate.

Lonchitis.

Loc. Himal. elevated among birch at Pye Pundo. Bedd F. B. I., 128.

2. *Fr.* 4—5 in. pin. ov. delt., bluntly lobed half way down and serrated.

Lachenense.

Loc. Lachen R. Sikkim 13—16,000 ft. Bedd. F. B. I. 32.

3. *St.* scaly slender pin. subdeltoid, cut down below to rachis into lanc. lobes.

ilicifolium.

Loc. Simla. Jumna valley. Hattoo. Kumaon. Nepal. Sikkim, Changtam, Tambur R. 9,000 ft. (Doubtfully distinct from some forms of *auriculatum* and *aculeatum*.) Bedd F. B. I., 31.

†† *St. tufted*.

4. *St. scaly*, fr. 12—18 in l. pin. subsesile, ov. rhomb, falcate, prominently auricled above, truncate. *auriculatum*.

a. *Marginatum* Wall. pin. lobed upper edge.

(*radicans* Roxb.)

b. *Obliquum* Don; fr. less than 6 in l., pinnate, pin. shorter and broader, and more blunt (*cæspitosum* Wall).

c. *Lentum* Don, pin. cut into obl-mucronate lobes half-way to rachis.

Loc. Simla, Masauri Mossy falls 6,000 ft. Kumaon 2,600 ft. Nepal. Bhotan 9,000 ft. Sikkim. Khasia. Harabagh. Bedd F. B. I., 33.

5. *St. fibrillose*, slender, pin fr. 4—8 in l. ov. delt, lobed half-way down with sharp mucronate teeth. *Thomsoni*.

Loc. Simla, Hattoo. Kumaon. Sikkim 7—13,000 ft. Bedd F. B. I. 126.

6. *St. stram.* fr. 2—3 in l. throughout pinnate, sori on upper half of pin. *Atkinsoni*.

Loc. Sikkim, high level. Bedd. F. B. I. 362.

Intermediate between 2 and 3.

** *Lower pinnæ once pinnate*.

7. *Fr.* flaccid narrow, finely cut: pin. cut down to rach. into obl. rhomb pinnl. with aristate teeth. *Prescottianum*.

Loc. 10—12,000 ft. Simla, Narkunda; to Bhotan. Bedd F. B. I. 34.

8. *St. tufted scaly*, fr. ov. lanc. *Aculeatum*.

Of this generally distributed sp. there are var:—

(a). *lobatum*, text coriaceous, pinnl. confluent at base,

(b). *aculeatum* Sw. text. less rigid, pinnl. sessile, lowest free.

(c). *angulare* Willd. less rigid, lower pinnl. stalked sometimes deeply pinnatifid.

(d). *rufo-barbatum* Wall, rachis densely clothed with reddish brown filbrillose scales.

(e). *Tsus sinense* Hk. slender form ? *

9. *St.* scattered slender, polished, long terminal and lat. pin. lanc; segm. long rhomb, cut away one-half on lower side. *amabile*.

Loc. Nepal.

* * * *Lower pinnae more than once pinnate.*

10. Text. herb. fr. subdeltoid 4 pinfid. *Sikkimense*.

Loc. Mon Lepcha, Nepal 10—11,000 ft. Bedd F. B. I. 127.

Rhizome creeping 10—11.

11. *Fr.* 3—4 pinfid, or lanc, teeth copious, aristate, lowest pin. largest; soir near midrib in 2 rows. *aristatum*.

a. conifolium Wall more divided, segm. copiously toothed with lower lobes distinct.

b. Assamicum Kuhn, fr. subcor, 3 pinfid, lower pinnl. distant stalked, obl. lanc, acum.

Loc. Naini Tal. Nepal, Khasia Bhotan 4,500 ft. S Assam.

12. *Fr.* 4—5 pinfid, ov. delt; ult. div. lin. awned, sori solitary. *fœniculaceum*.

Loc. Cholà, Sikkim 7—10,000 ft.

f f Veins uniting slightly towards edge [not invariably] (*Cyrtomium*).

13. Pin. lanc. lobed (sometimes down to rachis below), sori in rows. *caducum*.

Loc. Assam to Simla to 7,000 ft. Bedd F. B. I., 45.

14. Pin. falcate, edge entire or slightly undulated, sori small scattered. *falcatum*.

B. caryotideum Wall, pin. large sharply toothed, slightly lobed or auricled.

Loc. Moist shade to 8,200 ft. Bhotan to Masauri (Lindhurst). Simla Khud between Elysium and Jacko.†

* Some of its many forms seem to connect *ilicifolium*, *Thomsoni*, *Prescottianum*, and through *Atkinsoni*, *Lachenense*.

† *Amabilis*, *aristatum*, *conifolium*, *fœniculaceum* have frequent reniform involucre.

44. NEPHRODIUM.

§ *Veins all free* (Lastræa) 1—28.

* Pin. lobed less than one-third down to midrib.

1. St. and rachis naked. *cuspidatum*.

(*P. elongatum* Wall), invol. fugacious.

Loc. Nepal. Khasia, Bedd F. B. I. 117.

2. St. and rachis densely fibrillose, blackish. *hirtipes*.

(Resembles *filix mas* in venation *A. Atratum* Wall.

a. *Scottii*, (Phleg.) Bedd. F. B. I. 345. non involucrate form.

Loc. Himal to 6000 ft. Nepal abundant, Bedd F. S. I. 96.

* * Pin. cut more than halfway down to rachis
into close, regular, entire, or nearly entire,
lobes.

† *Veinlets simple*. Invol. generally thin and fugacious.

A. Lower pinnæ hardly, if at all, reduced. (Patens group.)

3. Rhiz, wide creeping.

gracilescens.

Loc. Simla. Khasia. Bedd. F. S. I. 110, F. B. I. 253.

4. St. tufted naked: sori submarg., projecting on upper surface. *immersum.*

(Invol. like *Aspidium*.)

Loc. Assam. Bedd F. B. I. 252.

5. St. densely tufted, with rach. and underside villose above, sori medial. *calcaratum.*

(Lower pin. sometimes reduced.)

a. *Ciliatum* Wall (Asp) rach. densely pubescent, pin. broader lobes more blunt. Lastr. Sericea. Bedd F. B. I. 508.

Loc. Bengal to Sikkim. a. East Himalaya. Bedd F. S. I. 105, 246.

B. Lower pinnæ conspicuously reduced. (Conterminum group.)

Pin. cut nearly to rachis.

6. St. densely tufted, villose 6—8 in l.: fr. 8—12 in l.; lobes close slightly crenated; lower pin. distant; dwindling gradually; text. herb; veinlets 6—8. sori submarg. *canum.*

Loc. Himal. Hattoo near Simla. Bedd F. B. I. 307.

8. St. glossy naked or nearly so 1—2 ft. l; fr. 2—3 ft. l.; lobes bluntish entire or falcate, with prominent gland at base of pin. beneath, rach. and underside villose; text. subcor. sori submarg. veinlets prominent 10—12. *prolixum.*

a. *Tylodes*. Sori in line close to midrib, surf. naked, lower pin. reduced suddenly. Bedd, 106.

Oethodes. Hk. Sp. 4109. F. S. I. 107.

Loc. Wet shade. Nepal, Khasia, Sikkim, Assam.

7. St. very short: rach-stram. slightly downy: fr. obl lanc, narrowed from middle to both ends, *bipinnatifid*; 15—18 in l.: pin. sessile, ligulate, blunt, cut to broad wing into close entire blunt spreading lobes; tip subentire; lower gradually shortened much deflexed: text. firm; surf naked, bright green: veins distant 3—4. Sori small marginal: invol. minute fugacious.

Elwesii.

Loc. Sikkim.

9. St. naked or finely villose, 6—8 in. l.; fr. $1\frac{1}{2}$ —2 ft. l.; lobes close entire; rach and underside villose; text, herb. veinlets 6—8 sori medial.

Patens. Desv ? F. B. I. 370.

Bergianum.

(Possibly only a form with reduced pin.)

Loc. Khasia.

†† *Veinlets forked.*

10. *Rhizome* slender wide creeping.

Thelypteris.

Loc. Marshes 5—6,000 ft. Khasia, Kashmir. Simla, water-course on road to Mahsoo. Bedd, F. B. I., 44.

St. tufted.

11. *St. rach and surfaces, naked.*

Smyrmatium.

Loc. Khasia, Sikkim, Assam. Bedd, F. S. I., 108.

St. and rach. scaly.

12. Pin. lobed nearly to rach; text. herb.

Filix Mas.

a. *Affine*, pin. less blunt, narrower, edge toothed.

b. *Elongatum*, fr. subdeltoid; 4 pinfi; l. pin. 1 ft. or more l. 4—6 in br. F. S. I. 112 and 114.

c. *Cochleatum*, Don. *sterile* fr. pinnl. broad leafy lower deeply lobed: *fert.* fr. pinnl. contracted, covered with prominent invol. of large sori in 2 rows. F. S. I. 115.

d. *Odontoloma*. Bedd; fr. sm. lanc. 3 pinfid; *st. and rach naked* stram: pin. delt. lobes incisodentate, sori in one row. Bedd. F. B. I., 114.

e. *Nidus*, Clarke. St. in dense circ. tuft; *st. and rach. densely scaly*; fr. lanc, 2 pinnate, pinnl blunt obl. incisocrenate: sori 6—8 to each, medial. F. B. I. 372.

f. *Clarkei* (*Lastr.* Baker) see below.

g. *Odontoloma* Moore text, membr. invol. much fimbriated. F. B. I. 373.

h. Patentissima Presl. (intermedia B dd.) F. S. I.

111. Very variable according to elevation. Clarkei and Nidus are stunted forms at great elevations; elongata a somewhat higher form of cochleata, which, with the rest, are general.

Loc. 8—15,000 ft. general Nidus, Yakla Sikkim 12,000 ft.

Clarkei do. 10,000 ft.

13. Pin. lobed down to rach. sori restricted to tip of lobes.
apiciflorum.

(Resembles last except in restricted sori.)

Loc. 9,000 ft. Nepal. Sikkim. Bedd F. B. I. 40.

14. Scales dense, lin. black brown, firm; fr. lanc. 2 pinnate. 1—2 ft. 1., 3—5 in br: pin. sessile. cut to rach below, into close truncate entire lobes dilated at base and reduced below to auricles; subcor.; surf. glabr., veins 5—6 forked low down. *Clarki.*

(Intermediate between two former and possibly only a form of Filix mas. Otherwise the name of this *Lastrea* must be changed, as it is attached to a Euneplodium p 44.

Loc. Sikkim. Yakla 10,000 ft. Bedd. F. B. I. 370.

* * * Pin. cut nearly to rachis into toothed or pinnatifid lobes.

† St tufted.

St. 12—18 in 1.

15. St. naked lower pin. distant, deflexed. *flaccidum.*
(resembles bastard forms of filix foemina.)

Loc. to 6,000 ft. Khasia. Kashmir. Bedd. F. S. I. 250.

16. St. densely scaly, scales dark brown; pin. obl. lanc. blunt, lowest reduced: rach. ebeneous with long fibrillose scales: sori medial. *Brunonianum.*

Loc. 12—15,000 ft. Hattoo near Simla. Punjab. Kumaon. Bedd. F. B. I. 37.

St. 2—3 ft. 1.

17. St. and rachis densely scaly, scales large, bright brown with silky hairs: pin. lanc: pinul. blunt, lower pinifid, with copious aristate teeth, edge often incurved, sori close to midrib.

barbigerum.

a. Falconeri Bedd. F. B. I. 41, see further.

Loc. Simla to Kumaon on rocky banks, general. Sikkim.
8—15,000 ft. Bedd. F. B. I. 227.

**** *Caudex erect, frond small or middle sized, tri-or quadri-
pinnatifid: invol. firm persistent.*

† Fr. lanceolate; text herb.

18. Lowest pin. equal to next; St. and rach. sparingly scaly
fr. obl. lanc. 12—18 in. 1.

a dilatatum; fr. ov. lanc or subdeltoid, larger and deeper cut
under surf. glandular. (Color, pale green; very variable in size
and form.)

Loc. West Himalaya generally.

19. Lowest pin. largest: St. glossy above, rach. naked or
slightly scaly; fr. 1—2 ft. 1., ov lanc., pinul, lanc. with blunt obl.
lobes, lowest sometimes compound. *sparsum.*

a. Nitidulum. Wall. *purpurascens.* Don. St. castaneous
Bedd. F. S. I. 374.

b. Gracilis, Moore: fr. 3—4 in 1. lanc. 2 pinfid, St. and rach
scaly. Bedd. F. B. I. 198.

Loc. Simla to Nepal, Khasia, Assam. Simla below spur of
Elysium Hill.

20. St. densely scaly, rach. densely fibillose throughout; fr.
obl. lanc. lobes obl. blunt with revolute edges, sori close to midrib
of pinul. *Falconeri.*

(Var of *barbigerum.* Bedd F. B. I. 41.)

Loc. Kashmir.

† †. Fr. deltoid.

21. Rach. and underside pubescent. sori copious *odoratum.*

Loc. Rocky crevices exposed, 7—8,000 ft. Simla to Kumaon Sikkim.

***** *Fronds ample* (18 in. or more l., 12 in br.) *decompound*,
Involucre often small and fugacious.

† *Text. herbaceous* (or subcoriaceous.)

Sori submarginal.

22. St. 1 ft. or more. tufted slender glossy; basal scales dark brown lin.; fr. deltoid, 1—3 ft. l. 9—18 in b., lower pin. often 1 ft. l. with centre uncut for $\frac{1}{4}$ — $\frac{1}{2}$ in. bluntly lobed or with similar pinfid pinnl.; rach. and surfaces nearly naked. text. pap. herbaceous; colour bright green; sori copious. *dissectum*.

Membranifolium. Presl.

Loc. Chittagong, Sylhet, Bhotan, Khasia, Assam. Bedd F. S. I. 102.

Sori near midrib (23-26.)

23. St. stout, polished, chestnut or blackish, scaly; lower pin. 1 ft. l.; 6 in br., close lanc. pinnl. blunt, unequal-sided, a broad centre uncut; text. coriaceous: rach. chestnut brown sori in rows: *splendens*.

Loc. Nepal, Sikkim, Bhotan, Bedd F. B. I. 42.

24. St. stram, or brown, scaly: lower pin; 12—18 in l. 6 in br., pinnl. cut to a winged rach. into blunt toothed lobes: text herb.; sori in rows. *Boryanum*.

Loc. Simla to Kumaon to 7000 ft. Khasia to Assam.

25 St. stout, clothed at base (and rach) with light-brown silk fibrils, fr. subdeltoid, lower pin. lanc. often 12 in l. 4—5 in br. pinnl. close with distinct segm. and subentire lobes; text. firm; sori small copious (Invol. fugacious). *Intermedium*.

Loc. North India.

26. St. and rach. bristly with dark brown scales: fr. deltoid. 3—4 pinfid, lower pin. largest. subdeltoid, unequal-sided; pinnl. cuneate at base below: ult. lobes obl. blunt: text mod. firm, surf. glabrous. (Invol. persistent). *pulvinuliferum*.

Loc. East Himalayas, Bedd, F. B. I., 333.

Sori medial, 27.

27. *St.* and *rach.* purplish, purple scaly; *fr* subdelt. ripin. tert. pinnl. pinfid with crenated *segm.*; lowest pin. largest delt. unequal-sided, 2 lower basal second. pin. much produced: setæ copious on chiefly upper, costæ, otherwise glab. *Hendersoni.*

Loc. Shillong Hills Khasia, 6,000 ft. (near *pulvinulifera*)
Bedd F. B. I. 377.

Rhiz. creeping (28—29).

28. *St* ebeneous scaly; *pin.* flexuose; *pinnl* distant, cut to *rach.* below into toothed lobes: *text.* firm; *rach.* and *surf.* naked; *sori* in rows close to midrib of *pinnl.* *Angustifrons.*

(*text.* firmer than next).

Loc. Nepal.

29. *St.* scaly at base or throughout; *fr.* deltoid; lowest *pin* largest; *pinnl* close, cut to *rach.* into close pinfid lobes *rach.* of *pinnl.* and underside, finely villose; *sori* minute copious. *Setigerum.*

(*Invol.* very fugacious).

a. ornatum Wall. (Baker) *St.* erect and *invol.* wanting.
Phlegopteris Bedd. F. S. I., 171.

Loc. Assam. Hattoo near Simla, Bedd F. S. I. 99.

†† *Text coriaceous.*

30. *St.* densely (bright), scaly at base, smooth glossy; *rach* and surfaces naked glossy; *fr.* deltoid; *pinnl.* deltoid, base truncate on lower side; lower *segms.* often free, *ov.* obl; teeth mucronate; *sori* large copious close to midrib. *platypus.*

Var. of *Asp. aristatum*? Bedd F. B. I., 228.

Loc. Khasia 5,000 ft. F. B. I., 228.

ff Lower veinlets of contiguous groups united.—*Eune-*
phrodium. (30—41).

Fr. large pinnate.

A. *Rhiz.* wide creeping. (30—35).

† Lower pin hardly, if at all, reduced.

Lobes triangular.

31. Text. coriaceous; sori near extremity, principally in lobes. *unitum.*

a. propinquum; rach. and under side villose.

Loc. near water : Chittagong, Khasia, Assam.

32. Text. papyr. herb; sori marginal; confined to lobes.

pteroides.

Terminans Wall.

Loc. Himalayas. Bedd F. S. I., 90.

Lobes lin. oblong.

33. Text. papyr. herb; sori terminal, in rows, not confined to lobes. *extensum.*

(Lobes further apart and deeper; text. more herb. than last),

Loc. Khasia, Assam.

†† *Lower pinnæ conspicuously reduced.*

St. naked, pin. cut $\frac{1}{3}$ rd down into triangular acute lobes.

34. Rach. and under surface densely pubescent; pin dwindling suddenly to auricles; sori subterminal. *cucullatum.*

(*Canescens* Presl).

Loc. Himalayas.

35. Rach. and under surface naked or slightly hairy; sori medial. *aridum.*

(*Venulosum* Wall).

Loc. Northern India, Bedd F. B. I., 297.

St. villose.

36. Pin. cut $\frac{1}{2}$ down into entire obl. falcate lobes; base of lower pinna and under surface glandular. rach. densely hairy *Hirsutum.*

Loc. Assam, Bedd F. B. I. 46.

37. Pin. cut to br. wing into close falc. blunt lobes, lowest distant much reduced. rach. ribs and edges densely downy. *clatum.*

Loc. Himal. Bedd F. S. I. 378.

B. Caudex erect, or sub-erect.

† Pin. entire or slightly lobed, so that most of the veinlets unite.

38. Pin. entire or slightly lobed truncate at base, or auricled fertile and contracted; rach. and under surface sometimes glandular. *Glandulosum.*

Loc. Himal, Assam. Bedd F. B. I., 132—3.

39. Pin. cut $\frac{1}{4}$ down into bluntish, slightly falcate lobes lower shorter deflexed: text. papyr. herb: veinlets 4—6; sori in rows close to midrib. *Amboynense.*

a. Minor. Bedd F. B. I. 201.

Loc. North India. *a. Ceylon.*

40. Pin. cut $\frac{1}{4}$ down into falc. lobes; lower pin. divergent: distant, veinlets 6—9: sori medial. *Pennigerum.*

Multilineatum Wall.

Abruptum. Bedd F. S. I., 86.

a. Abortivum I. Sm.

Loc. Near water Himal. Simla. Masuri, Kampti falls) Bedd, F. S. I., 86.

†† Pin. cut from $\frac{1}{4}$ to $\frac{3}{4}$ down to midrib.

St. tufted.

41. Pin. distant and shortened below; rach. and surfaces villose; herb.; pin. cut half down to rach. *molle.*

Didymosorum F. B. I. 200. F. S. I., 84. *nemorale* and *parasiticum.* Wall. P. *tenerum* Roxb *canescens.*

Loc. near water. Chumba. Kumaon. Banda. Simla 1st—2nd water-fall.

42. Rach, slightly villose, under surface nearly or quite naked; papyr. herb. pin. cut $\frac{1}{2}$ or more. *truncatum.*

a. Ensorum Bedd F. B. I. 130.

Loc. North India. Bedd F. S. I., 8.

St. densely black fibrillose afterwards roughened; surfaces glossy coriaceous,—pin. cut $\frac{1}{2}$ down to rachis, close sori in row to main vein. *ferox.*

Loc. Kumaon. Bedd F. B. I. 129.

43. *St.* and rach. scaly, surfaces naked, herb; pin, horizontal cut half down to rachis. *crinipes.*

(Distinguished from *truncatum* by scaly *St.* and rach).

Loc. Sikkim Himal. Bedd F. B. I. 263.

fff. Lower veinlets of contiguous groups united, and those of same group slightly so. (*Pleocnemia.*)

Fr. 2 ft. or more l.

44. Caudex. subarborescent *St.* striated; *fr.* subdeltoid; pin simple or lowest with 2—3 pinnated pinnl. on lower side; segm. lobed to a broadly winged rach. *Leuzeanum*

(Invol. very fugacious).

Loc. Sylhet. Mishmi. Assam. Bedd F. B. I. 134.

45. *St.* tufted pubescent; *fr.* delt. 3 pinnate or 4 pinfid, finely pubescent: lower pin. much largest, deltoid, unequalsided; stalked. *giganteum,*

(Text. and hab. of *cicutarium*).

Loc. Bedd F. S. I. 80.

46. *St.* rach. and surfaces pubescent. *fr.* lanc. pin. deeply pinfid—alt., lower reduced, or to auricles: pinfid nearly to rach. pinnl. lanc. subentire or deeply pinfid, serrated and ac. to apex, Invol hairy, ciliated (sori nearly terminal on veinlets chiefly at base). *Clarkei.*

Loc. Sikkim Dikeeling 4000 ft. Bedd F. B. I. 368.

ffff *Veins anastomosing copiously, usually with fre included veinlets: pinnae and segments ample.*

(*Sagenia*)

+ Sori copious, scattered irregularly. (47—50).

Rhizome creeping. 47—49.

St. short 47.

47. *St.* narrowly winged nearly to base; *fr.* cut down to broadly winged rach. into entire lin. obl. pin. *St.* winged, main viens not distinct to edge. *vastum.*

Alatum Wall.

Loc. Sylhet. Khasia. Assam. Bedd F. B. I. 169.

St. long 1 ft. or more, main veins distinct to edge, sori on connected veinlets 48—49.

48. *Fr.* 12—18 in l. subdeltoid, with deeply pinfid lobed apex and 1—2 side pin. lowest stalked; text herb. sori rather large
subtriphyllum.

Loc. N. India Bedd F. B. I. 48, 242.

49. *Fr.* 2—4 ft. l. with large obl. entire terminal and 2—6 similar lat. *pin.*; text. subcor., sori small abundant.

Aspid Wall.*polymorphum.*

a macrocarpum. Bedd F. S. I. 117.

Loc. Kumaon, Sikkim, Khasia; Bhotan; Mishmi, Assam to 4,000 ft. Bedd F. S. I. 116.

St. naked; fr. delt. more than 1 ft. l. 50—1.

50. *St.* and rach. naked stramin *fr.* pinn. pin. stalked, entire. gemmiferous in axils. sori often confluent.
heterosorum,

Loc. Chittagong. Bedd F. B. I. 47.

51. *St.* and rach. ebeneous: *fr.* 2 pinfid, br. as l., pin. lanc. lowest stalked with pair of large pinnl. at base. surf glabrous, sori 3—4 serial irreg., invol. minute fugacious.
Simonsii.

Loc. East Himalayas.

St. scaly, *fr.* subdeltoid not more than 1 ft. l. 52.

St. with num. *shining* black scales (dense at crown): *fr.* pinnate, fert. one much contracted: pin, blunt falcate lobed, lowest unequal-sided: rach, and surfaces pubescent, areolæ *without* free included veinlets; sori copious very l. covering contracted surface.
fuscipes.

Loc. Himalayas, Cachar and North India. Berma Bedd F. B. I. 366.

Differs from *dissecta* Desv. by its sm. size 8-12 in l. and scales. Birma plants of softer text, more pubesc. and anastomosis less copious.

†† Sori large, confined to a distinct row on each side of principal veins. 52—3.

Rhizome creeping.

52. Text. papyr. herb : *fr.* subdeltoid, apex sinuated pin.
pinfid sometimes to rach. below. *variolosum.*

(*Aspid.* Wall).

Loc. Parasnath, Telyn above Sylhet. Bedd F. B. I. 170.

53. Text. subcoriaceous, *st.* and rach. winged pin. sinuated lin.
obl. lowest sometimes forked, sori biserial. *decurrens.*

Loc. Khasia. Assam. Bedd F. S. I. 82.

54. *St.* ebeneous : *fr.* subdeltoid, more than 1 ft. l. ; lowest
pin. subdeltoid, dceply pinfid, or pinnate below.

cicutarium.

Loc. wet rock Himalaya to 5,000 ft. Masuri, (Mossy falls)
Kumaon Bedd F. S. I. 81.

55. *St.* scaly, *fr.* deltoid 10—12 in each way, 3 pinfid ; rach
broadly winged above lowest pin. which is shortly petioled, largest
unequal-sided, with falcate lobed basal pinnl. *subconfluens.*

Loc. Himalayas (Henderson). Bedd. F. B. I. 364.

NOTE.—Many Sp. still grouped in *Sagenia* have varying involucre, from
uniform to peltate, or absent altogether.

45—NEPHROLEPIS.

1. Caud. suberect or oblique, its wiry fibres often bearing
tubers, *fr.* 1½—2 in br. pin. imbricated, blunt ; sori medial
cordifolia.

Edule. Don.

a delicatula. Decaisne, small delicate North India form.

Loc. Himalayas Kumaon.

2. *St.* tufted, *fr.* 3—6 in. br. pin. acute, sori submarginal.

exaltata.

Loc. Himal. Bhotan.

46—OLEANDRA.

1. * Shoots suberect, *St.* jointed below middle. *neriiformis*

Loc. Nepal. Khasia. Assam to 6,000 ft. Bedd F. B. I. 264.

* * Shoots trailing ; *St.* jointed near base.

2. Surf. naked, sori in single rows close to midrib. *Wallichii*.

Loc. Dry rock and trees to 7,000 ft. Simla (Chadwick falls) to Kumaon. Sylhet. Khasia. Assam. Landour tree North East corner of mall.

3. Surf. slightly pubescent, sori in 2 rows near midrib.

Cunnigii.

a longipes Hk. St. articulated near middle.

Loc. Assam. a. Moulmein. Bedd F. B. I. 135.

II.—Polypodieae.

48. POLYPODIUM.*

A. *Stems continuous with caudex* (Desmobryoid series): *sori medial on veins*.

f Veins free. (Phlegopteris) 1—6.

* *Pinnæ cut more than half-way down to rachis, into close regular lobes, veinlets simple.*

† *Text. coriaceous, St. naked.*

1. Lower pin. *not reduced* fr. 3—4 feet l. surfaces *naked erubescens*.

Loc. Near water 2—5000 feet Simla, Masuri, Mossy falls. Kumaon. Khasia.

† † *Text. herb. St. tufted villose.*

* In Phlegopteris and Goniophlebium the youngest available fronds should be examined. Many have been transferred to Lastræa and others may follow. Only *proliferum* is now retained by Beddome, who finds occasional involucrate fronds of all others. For similar reason Dietvopteris is transferred by him to Aspidium, so that all the Eremobryoid series are changing.

2. Lower *pin.* slightly reduced *fr.* 12—18 in 1,
appendiculatum.
 (main rach. often spinulose below).
 Loc. Near water. Simla 2nd waterfall, and lower glen. East
 Himal. Nepal. Bedd F. B. I. 256.
3. Lower *pin.* reduced to auricles: *fr.* 3-4 ft. 1. *auriculatum.*
 Loc. Near water, Simla. Masuri. Nepal to Assam. Bedd
 F. B. I. 203.
*** Pinnæ cut nearly or quite to rachis into toothed
 or pinnatifid lobes.*
4. *St.* and rach. glossy, under side slightly hairy *distans.*
 Loc. near water Simla to Masuri. Simla. above General
 Robert's house. Sikkim. Khasia. Assam 9-10,000 ft
**** Pin. tri-or quadri-pinnatifid.*
5. Rhiz. slender *fr.* 6--10 in each way, deltoid. *Dryopteris.*
 Loc N. India. West. Himal. 5-8000 ft. Bedd F. B. I. 74.
 Rhiz. firm villose, *St. viscid.*, *fr.* ample *punctatum.*
 Loc. Near water, N. India, Simla below Bp. Cotton's School.
*ff Veins pinnate, lower veinlets of contiguous groups joining
 (Goniopteris).*
** Pinæ pinnatifid or distinctly crenate.*
 Rhiz. creeping.
7. *St. erect. veinlets* 15—20; *sori* in 2 close rows. *urophyllum.*
 a. *Moulmeinense* F. B. I. 3 and 231—2.
Cuspidatum Roxb. *Nephrod.* Wall (involucrate in young
 state. (Doubtfully distinct from *Meniscium cuspidatum*).
 Loc. General. Assam. Sikkim.
8. *Fr.* branching from axils.
 Depu. Beng. Kall ke janp, Hind. *poliferum.*
 Loc. Himalayas, Nynsee Tal, common in hilly regions low.
 down from Rájpur south, known as the creeping fern.
6. *St.* 1—2 ft. 1. reddish, *pin.* lobed less than 1 line deep. text
 papy. herb. *veinlets* 8 *lineatum*

a. costatum. F. B. I. 222 North India.

Loc. Himalayas 3500 ft. Simla, Glen. Masuri. Moosy falls
Kumaon. Mishmi. Nepal. Sylhet. Ghurwal. Bedd F. B. I. 220.

10. *St.* 2-4 ft. or more, *pin.* lobed 1 line deep, *text.* coriaceous
veinlets 15-20 *mu'tilineatum*.

Loc. Assam. Gowhatti. Bhotan. Sylhet. Sikkim. Parasnath.
Pundua. Kumaon to 3000 ft. Bedd F. B. I. 231 and 3.

B. *Stems articulated at point of junction with Rhizome*
Eremobroid series. Sori terminal on veins.

f Veins free (Eupolypodium).

* *Fronde pinnatifid.*

† Lobes reaching nearly down to main rachis.

11. *St.* tufted, short, fringed with soft hairs, surface ciliated.
Khasiainum.

Loc. Trees Khasya and Assam 3—4000 ft. Bedd F. B. I. 173.

** *Fronde pinnate.*

† *Pin.* close, casually confluent at base.

Fr. half inch or less br. 12-13.

12. *St.* densely tufted, having sori 1 to each *pin. trichomanoides*

Loc. Sikkim Bedd F. B. I. 2.

13. *Rhiz.* short creeping scaly, sori 2-5 to each *pin. medial*
Parvulum.

Loc. Trees, N. India to 8,500 ft.

Fr. More than half inch broad, flaccid, pendulous.

14. *St.* densely tufted hairy, surface villose, sori 1 to each
tooth *Subfalcatum.*

Loc. Himal. Kumaon 8-8500 Sikkim Bedd F. B. I. 76 and 189.

*** *Fronde tri-quadripinnatifid.*

15. *Rhiz.* wide creeping scaly; *st.* and rachis naked glossy
fr. subdeltoid. dareæforme

Leucostegia Hookeri Bedd. F. B. I., 95 *Polyp. Clarkei* F. B. I.
174.

Loc. Khasia. Sikkim. Moulmein.

16. *St.* tufted, naked or furfuraceous; *fr.* 24 in l. or more
12-18 in br. *Subdigitatum*

Coniifolium Wall.

(Tubers in axils of pin., *fr.* larger than last; probably a
Leucostegia.)

Loc. 7—8000 ft. Nepal. Sikkim. Bedd. F. B. I. 229.

ff Veins forming regular ample areolæ, each with a distinct free included veinlet, sori terminal on latter. (*Goniophlebium*.)

† Under surface not at all, or slightly, scaly.

Fr. pinnatifid.

17. *Rhiz.* fibrillose; lowest pin. deflexed. *Amœnum*.

Loc. 6 to 10,000 ft. Dalhousie. Simla to Kumaon. Nepal. Khasia. Bhutan. Common. on trees and rocky banks. Bedd. F. B. I., 5.

Fronde pinnate. Sori and areolæ uniserial.

18. *Fr.* flaccid; pin. close dilated and *casually* confluent at base, slightly toothed, spreading; text. papyr. herb. *rach* polished; *rhiz.* densely (black bristly) scaly. *lachnopus*.

Loc. 4—6000, ft. Khasia. 9—11,000 ft. Sikkim. Nepal. Kumaon to Simla; generally on rock.

Sori near midrib.

19. *Fr.* obl. delt. caudate; pin. obscurely repand, blunt, adnate, lowest narrowed at base; text. subcoriaceous; *rach.* pilose below; veins raised, distinct to edge; *rhiz.* thick glaucous.

erythrocarpum.

Loc. Sikkim. 8—11,000 ft. Bedd F. B. I. 382.

20. *Fr.* lanc. pin. patent, incisocrenate, lowest slightly narrowed at base: text. membr.; sori crowded, *rhiz.* very slender

Hendersoni.

Loc. Sikkim. 10—11,000 ft. Bedd F. B. I. 383.

21. *Fr.* lanc: pin. lanc. patent acute, and, except lowest, dilated at base: text. mod. firm: *rhiz.* thick firm: *st.* lower side castaneous. *macrorrhizoma*.

Loc. Sikkim, temp. region. Bedd F. B. I. 383.

22. *Fr.* obl. lanc. suberect: pin. acum. lowest not reduced
text member: rhiz. castaneous. *Argutum.*

Loc. Himalayas temp. region: Bedd. F. B. I., 6.

Pinnæ distinctly separated at base 23-5:

Rhiz. wide creeping *fr.* 6 12 in l. 23-4.

23. Lower pin: stalked, narrowed at base: *persicifolium.*
(*cuspidatum* Presl.)

Loc. Nepal. (Bedd ?) F. B. I., 79.

24. Pin. sessile; base rounded or auricled. *subauriculatum.*

Loc. Sikkim 8000 ft. Khasia. Gowhatti falls. Kumaon. Nepal.
Bedd. F. B. I., 78.

25. *St.* erect *fr.* 3 ft. or more l; text. coriaceous pin. num. distant
entire. *verrucosum.*

Loc. N. India. Bedd F. B. I. 257.

*fff Primary veins distinct to edge, connected by parallel
straight, or curved transverse veinlets; areolæ containing 2 or
more sori; free veinlets all directed towards edge.*

* Under surface matted with woolly or cottony tomentum. (Niphobolus.)

† Tomentum thin, adpressed.

26. *Fr.* dimorphous. *adnascens.*

Pertussum Roxb.

Loc. Simla. Kumaon. Nepal. Sikkim to Assam. Bedd. F.
S. I. 184.

Fr. uniform 26-28.

27. *Fr.* short, upper surface naked *Lingua.*
latus J. Sm. *heteractis* Mett. broader than Japan sp.

Loc. Mossy trees: Himal. 5,000 ft. Masuri Kamptie falls and
S. George's Dehra. Bhotan Bedd. F. S. I., 240.

Fr. more than 1 ft. l. 27-28.

28. Upper surface glabrous; sori small, in several rows, continuous over *fr.* *stigmatum.*

Costatum Wall.

Loc. Kumaon. Nepal. Sikkim. Khasia. Assam. Bedd. F. B. I. 120.

29. Upper surface naked. Sori in 1—2 irregular rows of 6—10. *subfurfuraceum*.

Loc. Mishmi, Bhotan. Bedd. F. B. I., 259.

†† *Tomentum* thicker, more woolly and looser.

30. *Fr.* dimorphous, bar. fr. roundish. *nummulariefolium*.

Loc. Himal. 2000 ft. Khasia. Mishmi. Assam. Bedd. F. S. I., 187.

Fr. uniform entire, narrowed gradually to both ends: veins hidden.

31. *Fr.* sessile, very woolly beneath; subcoriaceous. *fissum*.

Tomentosum. Roxb. *Mysurenses* Heyne.

Loc. North-west Himal. Kumaon, Nepal. Bhotan. Khasia. 5—6000 ft. Assam.

32. *St.* very short; fr. rigid coriaceous. *floccigerum*.

Loc. N. India.

Main veins distinct to edge.

33. Stem cottony upwards, upper surface naked, coriaceous; sori bright, in 4—6 straight rows.

flocculosum.

Loc. to 3,500 ft. Simla. Jack Kumaon. Nepal. Sylhet. Bhotan. Assam.

34. *St.* 1 ft. or more l., upper surface glabrous in 2 irregular rows. *Boothii*.

Loc. Bhotan. East Himalaya. Bedd. F. B. I., 258.

fff Areolæ fine, copious, irregular; the free veinlets spreading in various directions; sori various in position, generally on back of united veinlets. (Phymatodes.)

* *Fronde* simple 34-45.

† *Main veins not distinct to edge* 34-38.

A—Substance thick, all the veins obscure.

Fr. uniform.

St. none, or very short.

a. Under surface naked.

Sori large immersed, in single row near midrib.

35. *Fr.* 2—4 in l. coriaceous. *rostratum.*

Loc. Mishmi. Khasia. Bhotan. Bedd. F. B. I., 159.

36. *Fr.* 6—12 in l. subcoriaceous. *lineare.*

Loc. N. Ind. Himal. 5—10,000 ft. Bedd. F. S. I., 180.

37. Sori large copious, scattered irregularly. *superficiale.*

Loc. Khasia. Bhotan 3—6000 ft. Bedd. F. B. I. 75.

b.—Under surface matted or furfuraceous.

38. *Fr.* ligulate entire. *angustatum.*
coriaceum Roxb *Sphaerocephalum* Wall.

Loc. Assam. Bedd. F. S. I. 186.

B. Substance thinner, veins distinct:

39. Sori large prominent, in row near midrib. *normale.*
(veinlets prominent.)

(Best distinguished from large forms of *lineare* by non-immersed sori, and young sori without peltate scales.

Loc. North Bengal 4—6000 ft. Nepal. Khasia. Assam. Bedd. F. B. I., 10.

†† *Main veins distinct, nearly or quite to edge.*

40. *Fr.* dimorphous *rhyncophyllum.*

Hab. to 4000 ft.

Loc. Khasia. Assam. Bedd. F. B. I., 9.

Fr. uniform.

41. *Fr.* less than 12, in long, edge repand., text. coriaceous.
Griffithianum.

Loc. Trees to 7,000 ft.—to eastwards. Mishmi, Khasia, Bhotan.
Bedd F. B. I., 158.

42. Edge entire; text. herbaceous. *ovatum.*

Loc. Nepal to 7000 ft. Khasia. Bhotan. Sikkim. Bedd F. B. I. 157.

Fr. 1 ft. or more, long.

Text. very thin, edge entire or repand.

43. Rhiz. scales lurid green. *membranaceum.*

a. Grandifolium Wall; fr. large; sori scattered, copious.

Loc. trees 5—6,500 ft.: general over India proper Bedd F. B. I., 317.

44. Text. firm; edge entire; rhiz. scales brown; sori in rows of 4—6. *heterocarpum.*

(Resembles last, smaller and firmer.)

Loc. North. India. Bedd. F. B. I. 319.

45. Text. subcoriaceous; fr. sessile; sori scattered *copious irioides.*

Glabrum Roxb.

Loc. Trees eastern Himal. Sylhet, Assam.

46. Text. subcoriaceous; rhiz. woody, hypogynous. *hemionictideum.*

Loc. 4—6,000 ft. Simla to Masuri Nepal. Khasia. Assam. Bedd. F. S. I., 182.

* * *Fr. variously lobed but not regularly pinnatifid or pinnate* 46-7.

47. *Fr.* not in two halves. *pteropus.*

Loc. Khasia. Chittagong. Assam. Bedd. F. S. I., 179 and F. B. I., 11.

48. *Fr. flabellate, in two halves, lobed deeply from circumference towards base* (Dipteris) *Wallichii.*

Loc. Bhotan. Khasia (Nunklow), Pundoa Mt. Assam. Bedd. F. B. I., 80.

* * * *Fronds deeply pinnatifid* 49-58.

† *Fronds uniform* (barren fr. not drynaroid).

Fr. with terminal and lateral pinnæ.

49. Pin. edge entire or repand; coriaceous *trifidum*

Loc. Masuri. Kumaon 7,000 ft. to Khasia 4—5000 ft. Bedd. F. S. I. 175.

50. Pin. finely toothed: herbaceous *malacodon*.

a. *Stewartii* rhiz. scales firmer black. Bedd F. B. I. 204.

Loc. N. W. Himal. 10,500 ft. Simla, (Hatto); Kumaon Nepal. Sikkim 12—13,000 ft.

a. N. India.

51. St. winged nearly to base; sori small irregular, often confluent, papyraceous. *Dilatatum*.

Loc. 4—6,000 ft. Nepal, Khasia, Bedd F. B. I., 122.

Sori prominent on upper surface.

52. Fr. 1 ft. or more br. Colour dark green sub-coriaceous, lobes sub-entire. *Nigrescens*.

Phymatodes Roxb. *scolopendria* Burm.

Loc. Sylhet, Assam.

53. Fr. 1 ft. or less br.: coriaceous: lobes sub-entire.

Longissimum.

Rubida I. Sm. *melanococca* Moore. *melanoneuron* Miq. (pin-much narrower than *nigrescens*).

Loc. Sylhet, Assam Bedd F. S. I., 176 and 388.

Sori prominent on upper surface.

54. Fr. cut down to winged rachis; main veins distinct to edge. *ebenipes*.

Loc. N. W. Himal., to 9,000 ft. Simla to Landour. Nepal 10,000 ft. Sikkim 8,000 ft. Bedd F. B. I. 138.

†† Fronds with either a separate sterile frond, or the base of ordinary one pinnatifid like a sessile oakleaf, browned rigid: (*Drynaria*).

55. Sterile fr. not separate. *conjugatum*.

Coronans Wall.

Loc: Kumaon. Nepal, Khasia, Sikkim 1500 ft., Mishmi, Assam, Bedd F. B. I., 13.

Sterile fr. distinct.

56. Fert fr. long stalked, rigid.

Quercifolium.

Goroor Beng.

Loc. Himal 1,000 ft. Bedd F. S. I. 188.

St. short distinct.

57. Text subcoriaceous, lobes bluntish or acute; free veinlets variously directed.

Propinquum.

a. *Molle* Bedd, fr. hairy, herb.; fert. fr. subsessile. F. B. I., 116.

Loc. Trees. Simla, Mahaso Devi Thor. Masuri to Assam 5—7,000 ft. Bedd, F. B. I. 160 a Naini Tal.

58. Text. papyraceous, lobes blunt: free veinlets directed towards edge.

Nivale.

(Much thinner than last with venation of *Goniophlebium*).

Loc. N. E. Himal.

* * * * *Fr. pinnate.*

Surfaces naked.

59. *Pin. narrowed at base, entire, stalked below.*

(*Ieiorhizon*).

Loc. Kumaon. Nepal. Sikkim. Bhotan. Khasia. Mountain district 5—7,000 ft.

Pin. rounded at base.

60. *Pin. edge wavy thickened; sori large 1 between each main vein; surface naked.*

Juglandifolium.

(*Capitellatum* Wall).

Loc. Srinigar, Simla, Landour, Kumaon to Khasia 4,000 ft. Bedd F. B. I., 12.

61. *Pin. edge entire or repand; sori in 2 rows, of 3—4 deep (Surfaces beneath finely pubescent).*

Lehmanni.

Loc. Darjiling. Bedd F. B. I., 260.

62. *Pin. edge wavy, scariose: sori in 2 rows of 3—4 (pin, broader than last and viens prominent).*

Himalayense.

Loc. N. E. Himalayas, Bedd F. B. I., 318.

12. GRAMMITIDEÆ.

50. NOTHOCHLÆNA.

† Fr. densely farinose beneath.

1 Rhiz. woody, St. matted, fr. bipinnate *Marantæ.*

Loc. Himal, 14—15,000 ft. Sikkim. Bhotan. Kumaon, Hattoo, near Simla.

52. GYMNOGRAMME.

A. Habit of *Aspidium*, sori obl. or lin.-obl. not forked.

f *Veins free.* (Differs from *Euphlegopteris* only in elongated sori).

1. Fr. bipinifid, pin. cut $\frac{1}{2}$ way into entire blunt lobes, rach. and surface finely villose, text. herb. *Totta.*

Loc. 4-8,000 ft. Simla, below 2nd water-fall on ledges, and Mahasoo. Kumaon. Assam.

2. *St.* and rach. glossy distinct, fr. bipinifid or bipinnate, pin. distant, cut nearly or quite to rach. surfaces naked. *aurita.*

Habit and text. (firmer than last) of *P. distans*.

Loc. N. Ind. to 6,000 ft. Khasia. Mumbree and Nuncklow. Lachen in Sikkim, Bedd F. B. I., 152.

** Fr. tripinnatifid.

3. Lower pin. often 1 ft. 1. *Opaca.*
Obtusata Bl.

Loc. Nepal. Khasia. Masuri, Mossy falls. Bedd F. B. I., 238.

B. *Habit of Cheilanthes*; sori lin. usually forked.

f f *Veinlets of contiguous groups uniting*, as in *Eunephrodium* and *Goniopteris* (*Stenogramme*).

4. *St.* tufted, villose, fr. pinnate, herb. surfaces villose. *Aspidioides.*

Loc. Khasia, 6,000 ft. Bedd F. B. I., 149.

fff *Veins free, under surface not powdery*, (*Eugymnogramme*).

5. *Fr.* pinnate. *Vestita.*

Loc. Simla rocks general, banks above Brewery fine. Landour North Mall, beyond guardroom and road to Priest's garden, rare Kumaon 7—8,000 ft. Bedd F. B. I., 154.

6. Fr. bipinnatifid, st. tufted. *Andersoni*.

Loc. Kumaon 13,000 ft. Bedd F. B. I., 190.

7. Fr. bipinnate; rhiz. creeping. *Javanica*.

Loc. 7—8,000 ft. Himalayas common, Dalhousie, Khasia, Assam, Bedd F. B. I., 57.

8. Fr. quadripinnatifid, deltoid. *Microphylla*.

Loc. Trees Surureen and Sanatola, Khasia Hills. Bedd F. B. I., 148.

C. Habit of Eupolypodium.

fff Veins anastomosing variously, and usually copiously. (Differs from Phymatodes only by its elongated sori),

* *Fronde simple.*

† Main veins hidden 9—10.

9. Fr. less than 1 in br., sori very short of edge. *lanceolata*

Loc. Moist rock and trees: 3—4,000 ft. Himalayas.

10. Fr. 1 in br. or more; sori reaching nearly to edge. *involuta*.

(Sori less oblique, midrib less slender than last).

Loc. Mountain districts. 4—6,000 ft. Kumaon to Sikkim. Bhotan. Khasia. Bedd. F. S. I., 50.

†† Main veins prominent.

11. Fr. dimorphous sub-coriaceous. *Hamiltoniana*.

Loc. Mishmi. Khasia. Sylhet. Bedd. F. B. I., 239.

53. BRAINEA.

1. Fr. pinnate.

insignis.

Loc. Khasia. 4,000 ft. Bedd. F. B. I., 139.

54. MENISCIUM.

Fr. pinnate.

1. Rhiz. wide creeping
- triphyllum.*

Loc. Sylhet. Chittagong. Cachar. Bedd. F. S. I., 56.

- 2.
- St. stout.*
- cuspidatum.*

a. *Parishii*. Pin. more herb. and pubescent.

Loc. Himalayas. Bedd. F. B. I., 184, 309.

55. ANTROPHYUM.

* *Sori sunk in distinct groove.*

- 1.
- Fr.*
- less than 1 in br. very thick.
- coriaceum.*

Loc. trees. Nepal. Khasia. (doubtful sp., requires investigation).

Fr. broader.

- 2.
- Fr.*
- acute; no midrib; sori deeply immersed.
- plantagineum.*

a. *Parvulum*. Bl.

Loc. a Khasia 4,000 ft. Bedd. F. B. I., 267.

- 3.
- Fr.*
- blunt or acute; midrib scarcely any; sori and areola distinctly raised above surfaces
- reticulatum.*

Loc. Himalayas.

* * *Sori superficial, or but slightly immersed.**Fr.* obovate, entire or repand towards cuspidate point. *latifolium.*

Loc. Bhotan, Bedd. F. B. I., 176.

56. VITTARIA:

* *Sori sunk in a two lipped marginal groove* (Euvittaria),

- 1.
- Fr.*
- 6—18 in l.
- elongata.*

Loc. Trees. Kumaon, Khasia to Assam. Bedd. F. S. I., 21.

* * *Sori in a slightly intramarginal line, with unaltered edge of fr. produced beyond, or rolled over it, (Tœniopsis).*

2. Midrib distinct throughout, raised *lineata*.
Loc. 3—8,000 ft. Trees. Himalayas. Kumaon. Bedd. F. S. I. 54

58. DRYMOGLOSSUM.

1. Sori midway between edge and midrib *carnosum*.
Loc. Nepal, Sikkim, Bedd. F. B. I., 55.
2. Sori in submarginal line. *piloselloides*.
Loc. Mossy trees Sylhet, Chittagong, Bedd. F. S. I. 55.

59. HEMIONITIS.

1. *Fr.* cordate hastate, 2—3 in. each way. *cordata*.
Loc. Rich wet soil. Calcutta. Bedd. F. B. I., 53.
2. *Fr.* subdeltoid pinnate. *Griffithii*.
Loc. Khasia, Bedd. F. B. I., 155.

XXX Acrosticheæ.

60. ACROSTICHUM.

f Veins frec.

* *Fronds simple.* Elaphoglossum.

1. Both surfaces of barren fr. nearly or quite naked, edge not fringed. *conforme*.

Marginatum Wall.

Loc. Trees and damp rocks to 6,000 ft. Nepal, Khasia.

2. Frond slightly scaly *viscosum*.

Loc. Trees and damp rock. Nepal. Khasia.

* * *Barren frond simply pinnate; pinnae like those of Lomaria in shape; coriaceous texture, and fine close venation (Stenochlœna)*

3. Rhiz. to 40 ft l. cable like, sometimes prickly; fr. 12-18 in l. rach often winged *fert. pin.* 2-4 in l. *Sorbifolium*.

Pteris scandens Roxb. Panna valli Rheed. Mal XII 35.

Lom. scandens Willd, *longifolia* I. Sm.

Loc. Various parts of India, Roxb. continent ?

4. Rhiz. wide creeping; fr. 1-3 ft. l. *fert pin.* 6-12 in l.

Scandens.

Loc. R. Magna Sylhet. Himal middle region. Bedd. F. S. I., 201.

*** *Barren fr.* not *Lomaroid* in habit, with the veins pinnate in ultimate divisions of barren frond.

Seta in sinus of ultimate divisions (*Egenolfia*).

5. Fr. pinnate.

appendiculatum;

a *asplenifolia* Bory F. S. I. 195.

Loc. Himalayas, a General Bedd. F. S. I., 194, F. B. I. 100-1.

ff Veins anastomosing copiously.

* *Fr. dimorphous.*

† Main veins distinct nearly or quite to edge.

(*Gymnopteris*).*

6. Barren *fr.* entire-obl. spathulate:

variabile.

a. *laciniatum* Hk. bar. *fr.* irregularly pinfid. fert, *fr.* pinnate-Lomarioid.

b *Feei* F. B. I. 274. F. S. I. 211, variable in cutting, with every form of venation to that of *lanceolatum*. (Bedd).

Loc. 2—3,000 ft. Khasia, Assam. Bedd. F. B. I. 272—3 and F. S. I. 48.

7. Bar *fr.* with 1—3 pairs of pinnæ.

flagellifolium.

Loc. Nepal, Assam, Chittagong. Bedd F. B. I 112.

8. Bar. *fr.* copiously pinnate.

virens.

(*terminans*, Wall).

(b). *crispatulum* Wall. pin. coriaceous crisped.

(c). *costatum* Wall. pin. tinged red. N. Ind.

(d). *deltigerum* (*Meniscium*) Wall. fert. pin. nearly as br. as barren; sori in patches.

(e). *undulatum* (*Nothochloëna*) Wall. sori in br. bands along edge of pin. which is sometimes lobed between main veins.

* Venation not constant, varying to *Chrysodium*. *Semicordatum* (Chrys) same as *contaminans* (Gym); *axillare* (Chrys) and *lanceolatum* also exhibit every form of venation from one subgenus to another, according to Beddome (Supplement).

Loc. Kumaon, Chittagong, Nepal, Sylhet, Sikkim, Bhotan.
Khasia Assam. Bedd F. B. I. 113—115. F. S. I. 202-3. d. 114.

†† *Main veins none or indistinct (Chrysodium).*

Barren. fr. entire, 8-9.

9. bar. fr. 2 in. or less l., herb. *minus*

Loc. 2—3,000 ft. Churra in Khasia. Bedd F. B. I. 116.

10. Rhiz. woody; fert fr. 6-12 in l. on st. as l.; text. herb.;
main veins raised, but short of edge. *lanceolatum;*

a. *normalis* I. Sm. bar. fr. sessile.

b. *trilobata* Bedd F. S. I. 273 south Ind.

c. *pinnatifida* „ F. S. I. 211 Ceylon.

d. *minus* Mett. small form (9).

e. *metallia* „ fr. sessile 3-7 in l. nearly 1 in br. bright blue :
fert fr. sori at apex only. F. B. I. 390 Haycock Mt.
on moist rocks. And forms with contracted fr. sori-
ferous at apex as in *Hymenolepis*.

Loc. Peninsular Ind. Bedd F. S. I. 48 F. B. I. 274.

11. Fert fr. 6-12 in l. flexuose, on st. half as l.: text papyr.
on main veins. *axillare.*

Creeping form of *lanceolatum* (Bedd).

Loc. Sylhet, Bhotan, Assam. Bedd F. B. I. 271.

Barren fr. pinnatifid.

12. bar. fr. with terminal and 2 lat. entire obl. lobes
tricuspe.

(upper half sometimes contracted and soriferous at apex.
as *Hymen*).

Loc. Sikkim. Bedd F. B. I. 53.

Barren frond copiously pinnate.

13. Rhiz. woody wide scandent. *Blumeianum.*

Loc. Assam. N. Ind.

14. Fr. not dimorphous; upper pin fertile. *aureum.*

Emarginatum Buch. *inaequale*, *speciosum*, Willd. *vulgare* Fec.

Distinct from all others.

Loc. Sylhet, Hattia Island, Bengal, Salt marshes Bedd. F. S. I. 204.

* * Frond uniform, simple, bearing fruit on contracted apex (Hymenolepis).

15. Rhiz. woody. *spicatum.*

Seeding not constant. Bedd.

Loc. To 6,000 ft. Himal. Sikkim. Khasia, Churra, Assam.

Sub-order III.—Osmundaceæ.

62. OSMUNDA.

1. *St.* ferruginous woolly, *fr.* bipinnatifid. *Claytoniana.*
Pilosa and *monticola* Wall.

Loc. Himalayas to 10,000 ft. Khasia. Ridge beyond Landour near former Govt. garden (Dr. Jameson). Bedd F. B. I. 187.

2. *St.* naked, *fr.* bipinnate. *regalis.*
(fert. pinnl. cylindrical).

b. speciosa Wall. fert. and bar. *fr.* distinct; lat. pin. occasionally fertile.

Loc. Himalayas. Simla, Chadwick falls.

Sub-order IV.—Schizeaceæ.

64. SCHIZÆA.

Fertile segments digitate rather than pinnate, caps. in 4 rows.
(*Astinostachys*).

1. *St.* flattened, midrib prominent beneath *digitata.*

Loc. Marshy ground, Khasia. Bedd F. B. I. 268.

68. LYGODIUM.

f Veins free. (Eulygodium).

Habit climbing.

* *Fully developed barren pinnules pinnate.*

† Segments articulated at base.

1. Terminal and lateral *segm.* (variable in shape), ovate or ligulate, obl. or hastate. *scandens.*

Semibipinnatum. Wall. *Tsjeria valli panni.* Rheed. Mal. XII 33-4. *Oph. filiforme.*

(*Microphyllum* Br.) *segm.* sh. br.

Loc. Himalayas 3,000 ft. Dalhousie, Rājpur Bedd F. S. I. 61.

2. Term. and lat. *segm.* ligulate obl. *pinnatifidum.*

Tsjuria valli panni. Rheed ib.

Loc. Himalayas 3,000 ft. Kumaon. Bedd F. S. I. 62.

† † Segments not articulated at base.

3. Pinnule deltoid. *Japonicum.*

Loc. Himalayas 3,000 ft. Kumaon; Saharunpore, Malva bank of Mahanuddar R. Bedd F. S. I. 64.

Sub-order V.—Marattiaceæ.

69. ANGIOPTERIS.

Fr. bipinnate 9—15 ft. l. *erecta.*

Crassipes Wall *Marattia pinnata* Roxb.

72. KAULFUSSIA.

1. *Fr.* ternate or 5 digitate *cesculifolia*

(*Assamica* Griff.)

Loc. North. Ind. Upper Assam. Bedd F. B. I. 185.

Sub-order VI.—Ophioglossaceae.

75. OPHIOGLOSSUM.

f Fertile spike, springing from base of barren segment.
Euophioglossum.

1. Fr. without a distinct haft. *vulgatum*.

Loc. Himalayas.

3. Fr. with distinct haft. *reticulatum*.

Cordifolium Roxb. Danga ghechu or Ekteera Beng.

Loc. (of both) hard ground. Himalayas. Bengal.

ff Fertile spike usually single, springing from centre of barren segment. *Ophioderma*.

3 Fr. pendulous, without stem, fleshy *pendulum*.

Loc. On trees Assam. North. Ind.

74. HELMINTHOSTACHYS.

1. *zeylandica*.

Osmunda Roxb. ekbeera Beng.

Loc. Himalayas.

75. BOTRYCHIUM.

* Texture thick, strong bipinnate *Lunaria*.

Loc. Himalayas. Bedd F. B. I. 208.

* * Text. thin.

1. Ster. segm. stalked *tri*-pinfid or *tripinnate daucifolium*.

Loc. Himalayas. Devi Thor Mnt. Simla. Naini Tal.

2. Sterile segm. sessile 4 pinfid, fr. more finely cut. *virginianum*.

Loc. Himalayas. Landour on trees. Simla, Glen, Chadwick falls, Elysium hill. Khasia to 1,000 ft.

SPECIES COLLECTED NEAR SIMLA, 1875-7.

WOODSIA ELONGATA—

- Dicksonia scabra
- Trichomanes auriculatum (Lord Northbrook)
- Davallia immersa
- " chærophylla
- " tenuifolia
- Cystopteris fragilis
- Adiantum lunulatum
- " caudatum
- " Capillus Veneris
- " venustum
- " pedatum (Captain Biddulph)
- Cheilanthes subvillosa
- " Dalhousiæ
- " rufa
- " farinosa
- Onychium Japonicum
- Cryptogramme crispa
- Pteris longifolia
- " cretica
- " quadrianrita
- " longipinnula
- " excelsa
- " aquilina
- Woodwardia radicans
- Asplenium ensiforme
- " alternans
- " trichomanes
- " resectum
- " heterocarpum
- " planicaule
- " varians
- " exigium, *Bedd.*
- " tenuifolium
- " hohenackerianum
- " thelypteroides
- " macrocarpum
- " nigripes
- " oxyphyllum
- " Felix fœmina
- " Japonicum
- " longifolium
- " polypodioides
- Aspidium ilicifolium
- " auriculatum

- Aspidium Thomsoni
 " Prescottianum
 " aculeatum, Sw.
 " angulare
 " rufobarbatum
 " falcatum
 Nephrodium gracilescens
 " canum
 " thelypteris
 " elongatum
 " cochleatum
 " Brunonianum
 " barbigerum
 " sparsum (Miss ffoulkes)
 " odoratum
 " Boryanum
 " setigerum
 " pennigerum
 " molle
 Oleandra Wallichii
 Polypodium erubescens
 " appendiculatum
 " auriculatum
 " distans
 " punctatum
 " lincatum
 " amoenum
 " lachnopus
 " adnascens
 " membranaceum
 " hemionitideum
 " malacodon
 " ebenipes
 " propinquum
 " Juglandifolium
 Nothochlæna Marantæ
 Gymnogramme Totta
 " vestita
 " javanica
 Osmunda regalis
 Botrychium daucifolium
 " virginianum
-

SPECIES COLLECTED AT MURREE, 1879.

-
- Adiantum caudatum.*
 „ *capillus Veneris.*
 „ *venustum.*
Cheilanthes Dalhousiae.
 „ *farinosa.*
Onychium Japonicum.
Pteris longifolia.
 „ *Cretica.*
 „ *aquilina.*
Asplenium alternans.
 „ *Trichomanes.*
 „ *varians.*
 „ *nigripes.*
 „ *Japonicum.*
 „ *Polypodioides.*
 „ *septentrionale* (from Kashmir).
Aspidium aculeatum.
 „ *rufobarbatum.*
Nephrodium spinulosum.
 „ *odoratum.*
 „ *intermedium.*
 „ *Boryanum.*
Polypodium. (Euphleopteris apparently new.)
Gymnogramme Javanica.
Botrychium virginianum.
-

ERRATA AND ADDITIONS.

P. S. L. 7 for galbra read Glabrä.

P. 9, L. 8 from bottom for fiem read fæm.

P. 17, L from bottom to Cheilanthes Szovitzii add Safvet koh Affghanistan.

P. 18, L. 16 commence 2.

P. 24 No. 9 Aspl. *Normale*.

A. Multijugum Wall.

Loc. Himal. of Nepal. Sylhet.

Khasya. Sikkim. Assam.

NOTE.—That rare fan fern *Actiniopteris radiata* is found at Dalhousie.

INDEX TO SPECIES.

						Page
Acrostichum	Appendiculatum	...	...	...	...	61
"	Asplenifolium	...	...	...	...	"
"	Aureum	...	...	...	...	62
"	Axillare	...	...	...	...	"
"	Blumeianum	...	...	...	...	"
"	Conforme	...	...	...	...	60
"	Costatum	...	...	...	...	61
"	Crispatulum	...	...	...	...	"
"	deltigerum	...	...	...	...	"
"	emarginatum	...	...	...	...	62
"	Feei	...	...	...	...	61
"	flagellifolium	...	...	...	...	61
"	inaequale	...	...	...	...	62
"	Japonicum	...	...	...	...	64
"	laciniatum	...	...	...	...	61
"	lanceolatum	...	...	...	...	62
"	marginatum	...	...	...	...	60
"	metallica	...	...	...	...	62
"	minus	...	...	...	...	"
"	normale	...	...	...	...	"
"	pinnatifidum	...	...	...	...	61
"	scandens	...	...	...	...	"
"	sorbifolium	...	...	...	...	60
"	speciosum	...	...	...	...	62
"	spicatum	...	...	...	...	63
"	terminans	...	...	...	...	61
"	tricuspe	...	...	...	...	62
"	trilobata	...	...	...	...	"
"	undulatum	...	...	...	...	61
"	variable	...	...	...	...	"
"	virens	...	...	...	...	"
"	viscosum	...	...	...	...	60
"	vulgare	...	...	...	...	62
Actiniopteris	radiata	...	...	...	...	32
Adiantum	Capillus veneris	...	...	...	...	16
"	caudatum	...	...	...	...	"
"	Edgeworthii	...	...	...	...	"
"	flabellulatum	...	...	...	...	"
"	lunulatum	...	...	...	...	"
"	pedatum	...	...	...	...	"
"	venustum	...	...	...	...	"
Allantodia	Brunoniana	...	...	...	...	32
Alsophilla	Andersoni	...	...	...	...	8
"	Brunoniana. Wall.	...	...	...	...	"
"	Comesa	...	...	...	...	"

						Page.
<i>Alsophilla contaminans</i>...	...	...	...	...	...	8
" <i>glabra</i>...	...	...	...	...	...	"
" <i>khasyana</i> , <i>Moore</i>.	...	...	...	...	...	"
" <i>latebrosa</i>...	...	...	...	...	...	"
" <i>ornata</i>...	...	...	...	...	...	"
" <i>Scottiana</i>...	...	...	...	...	...	"
<i>Angiopteris crassipes</i>...	...	...	...	...	...	64
" <i>evecta</i>...	...	...	...	...	...	"
<i>Anisogonium</i> , see <i>Asplenium</i>	...	...	...	...	...	"
<i>Antrophyum coriaceum</i>...	...	...	...	...	...	59
" <i>latifolium</i>...	...	...	...	...	...	"
" <i>parvulum</i>...	...	...	...	...	...	"
" <i>plantagineum</i>	...	...	...	...	...	"
" <i>reticulatum</i>...	...	...	...	...	...	"
<i>Asplenium adiantum nigrum</i>	...	...	...	...	...	26
" <i>allantoides</i>...	...	...	...	...	...	27
" <i>alternans</i>...	...	...	...	...	...	24
" <i>Atkinsoni</i>...	...	...	...	...	...	28
" <i>Australe</i>...	...	...	...	...	...	29
" <i>bantamense</i>...	...	...	...	...	...	"
" <i>bipinnatum</i>...	...	...	...	...	...	31
" <i>brevisorum</i>...	...	...	...	...	...	28
" <i>bulbiferum</i>...	...	...	...	...	...	26
" <i>caudatum</i>...	...	...	...	...	...	24
" <i>Ceterach</i>...	...	...	...	...	...	31
" <i>Clarkei</i>...	...	...	...	...	...	27
" <i>decussatum</i>...	...	...	...	...	...	31
" <i>dilatatum</i> , <i>Bl.</i>	...	...	...	...	...	31
" <i>drepanophyllum</i>	...	...	...	...	...	27
" <i>ensiforme</i>...	...	...	...	...	...	23
" <i>esculentum</i>...	...	...	...	...	...	31
" <i>exigium</i> , <i>Bedd</i>	...	...	...	...	...	26
" <i>Filix femina</i>	...	...	...	...	...	28
" <i>fimbriatum</i>...	...	...	...	...	...	29
" <i>Finlaysonianum</i>	...	...	...	...	...	31
" <i>fontanum</i>...	...	...	...	...	...	26
" <i>fraxinifolium</i>	...	...	...	...	...	29
" <i>frondosum</i>...	...	...	...	...	...	30
" <i>furcatum</i>...	...	...	...	...	...	26
" <i>Grevillei</i>...	...	...	...	...	...	23
" <i>Griffithianum</i>	...	...	...	...	...	24
" <i>Griffithii</i>...	...	...	...	...	...	29, 30
" <i>heterocarpum</i>	...	...	...	...	...	25
" <i>heterophlebium</i>	...	...	...	...	...	31
" <i>Hohenackerianum</i>	...	...	...	...	...	27
" <i>Japonicum</i>...	...	...	...	...	...	30
" <i>laciniatum</i>...	...	...	...	...	...	25
" <i>lanceum</i>...	...	...	...	...	...	29
" <i>laserpitiifolium</i>	...	...	...	...	...	26
" <i>latifolium</i>...	...	...	...	...	...	31
" <i>lobulosum</i>...	...	...	...	...	...	30

					Page.
<i>Asplenium</i>	<i>longifolium</i>	...	...	...	30
"	<i>macrocarpum</i>	...	...	...	25
"	<i>macrophyllum</i>	...	...	...	25
"	<i>malabaricum</i>	...	...	...	31
"	<i>membranaceum</i>	...	...	...	28
"	<i>multicaudatum</i>	...	...	...	29
"	<i>nidus</i>	...	...	...	23
"	<i>nigripes</i>	...	...	...	28
"	<i>nitidum</i>	...	...	...	25
"	<i>normale</i>	...	...	...	24
"	<i>oxyphyllum</i>	...	...	...	28
"	<i>pectinatum</i>	...	...	...	28
"	<i>Phillitidis, Don</i>	...	...	...	23
"	<i>pinnatifido-pinnatum</i>	...	...	...	29
"	<i>planicaule</i>	...	...	...	25
"	<i>polypodioides</i>	...	...	...	30
"	<i>procerum</i>	...	...	...	29
"	<i>resectum</i>	...	...	...	25
"	<i>rutamuraria</i>	...	...	...	25
"	<i>rutæfolium</i>	...	...	...	27
"	<i>Septentrionale</i>	...	...	...	24
"	<i>Simonsianum</i>	...	...	...	23
"	<i>Sorzogonense</i>	...	...	...	30
"	<i>stenophyllum</i>	...	...	...	23
"	<i>Stoliczkæ</i>	...	...	...	30
"	<i>tencilum</i>	...	...	...	28
"	<i>tennifolium</i>	...	...	...	24
"	<i>tenuifrons</i>	...	...	...	28
"	<i>thelypteroides</i>	...	...	...	27
"	<i>tuimentosum</i>	...	...	...	30
"	<i>trichomanes</i>	...	...	...	24
"	<i>tripinnatum, Roxb</i>	...	...	...	26
"	<i>umbrosum</i>	...	...	...	29
"	<i>varians</i>	...	...	...	26
"	<i>viride</i>	...	...	...	24
<i>Aspidium</i>	<i>abortivum</i>	...	...	...	43
"	<i>abruptum</i>	...	...	...	"
"	<i>aculeatum</i>	...	...	...	33
"	<i>alatum</i>	...	...	...	42
"	<i>amabile</i>	...	...	...	34
"	<i>amboynense</i>	...	...	...	43
"	<i>angulare</i>	...	...	...	33
"	<i>aridum</i>	...	...	...	42
"	<i>aristatum</i>	...	...	...	34, 41
"	<i>Assamicum</i>	...	...	...	34
"	<i>Atkinsoni</i>	...	...	...	33
"	<i>atratum</i>	...	...	...	35
"	<i>auriculatum</i>	...	...	...	33
"	<i>caducum</i>	...	...	...	34
"	<i>canescens, Presl</i>	...	...	...	42
"	<i>caryotideum</i>	...	...	...	34

	<i>Page.</i>
Aspidum ciliatum ...	36
" cæspitosum ...	33
" conifolium ...	34
" cucullatum ...	22
" didymosorum ...	43
" extensum ...	42
" falcatum ...	34
" fæniculaceum ...	"
" glandulosum... ..	43
" hirsutum ...	42
" icifolium ...	32
" lachenense ...	32
" lentum ...	33
" lobatum ...	"
" lonchitis ...	32
" marginatum ...	33
" minor ...	43
" multolineatum ...	"
" nemorale ...	"
" obliquum ...	33
" parasiticum ...	43
" pennigerum ...	"
" Prescottianum ...	33
" propinquum ...	42
" pteroides ...	"
" radicans ...	33
" rufobarbatum ...	34
" Sikkimense ...	"
" terminns ...	42
" Thomsoni ...	33
" Tsus sinense ...	34
" unitum ...	42
" variolosum, <i>Wall</i> ...	46
Actinostachys, sec Schizœa	
Athyrium, sec Asplenium	
Blechnum Melanopus ...	22
" nitidum ...	"
" orientale ...	"
" Serrulata ...	"
Botrychium daucifolium tryc	65
" Lunaria ...	65
" virginianum ...	"
Brainea insignis ...	58
Campteria, see Pteris ...	"
Ceratopteris thalictroides	22
Chcilanthes argentea ...	18
" ealomelanos ...	19
" chrysophylla... ..	18
" Dalhousiæ ...	17
" fragrans ...	"
" farinosa ...	18

	<i>Page.</i>
Cheilanthes maderensis...	17
" nitidula ...	19
" rufa ...	17
" subvillosa ...	7
" Szovitzii ...	"
" Tamburini ...	19
" tenuifolia ...	"
" varians ...	"
Chrysodium, see Acrostichum	...
Cryptogramme Brunoniana	18
" Crispa ...	"
Cyathoea spinulosa ...	7
Cyrtomium, see Aspidium	...
Cystopteris fragilis ...	14
Danga ghechu ...	65
Darea, see Asplenium	...
Davallia Assamica ...	12
" bullata ...	13
" calves, <i>Wall</i> ...	14
" caucensgera, <i>Moore</i> ...	"
" Chinensis, <i>Sm</i> ...	"
" Chærophylla ...	12
" Clarkii ...	"
" divaricata ...	13
" Griffithiana ...	"
" hirta ...	14
" Hookeriana ...	13
" Hookeri, <i>Moore</i> ...	12
" immersa ...	"
" marginalis ...	14
" membranulosa ...	12
" multidentata ...	"
" nodosa ...	13
" pedata ...	12
" platyphylla ...	14
" pseudocystopteris ...	12
" pulchra, <i>Don</i> ...	"
" repens ...	13
" setosa ...	"
" Speluncæ ...	14
" strigosa ...	"
" tenuifolia ...	"
" Thomsoni, <i>Moore</i> ...	12
" wrophylla ...	14
" villosa, <i>Wall</i> ...	"
Depu ...	48
Diacalpe aspidioides ...	8
Dicksonia appendiculata	9
" barometz ...	"
" glaucum, <i>Bedd.</i> ...	"
" scabra ...	"

					Page.
Diplazium,—see Asplenium.					
Dipteris,—see Polypodium.					
Drymoglossum carnosum	...	...	...	...	60
„ Piloselloides...	...	...	...	...	„
Drynaria,—see Polypodium.					
Egenolfia,—see Acrotichum.					
Ekbeera ...	...	...	...	...	65
Ekteera ...	...	...	...	...	„
Elaphoglossum,—see Acrostichum.					
Gleichenia bullata, <i>Moore</i>	...	...	...	...	7
„ dichotoma ...	...	...	...	...	„
„ gigantea, <i>Wall</i>	...	...	...	...	„
„ longissima ...	...	...	...	...	„
Goroor ...	...	...	...	...	56
Goniopteris,—see Polypodium.					
Goniophlebium do do.					
Gymnogramme aspidioides	...	...	...	...	57
„ aurita ...	...	...	...	...	„
„ Andersoni ...	...	...	...	...	58
„ Hamiltoniæ ...	...	...	...	...	„
„ involuta ...	...	...	...	...	„
„ Javanica ...	...	...	...	...	„
„ lanceolata...	...	...	...	...	„
„ microphylla ...	...	...	...	...	„
„ obtusata ...	...	...	...	...	57
„ opaca ...	...	...	...	...	„
„ totta ...	...	...	...	...	„
„ vestita ...	...	...	...	...	„
Gymnopteris,—see Acrostichum.					
Helminthostachys zeylandica	...	...	...	...	65
Hemidictyum,—see Asplenium.					
Hemionitis cordata ...	...	...	...	...	60
„ Griffithii ...	...	...	...	...	„
Hemitelia decipiens ...	...	...	...	...	7
Hymenophyllum badium	...	...	...	...	10
„ Blumeianum <i>Spr.</i>	...	...	...	...	„
„ ciliatum ...	...	...	...	...	„
„ exsertum ...	...	...	...	...	9
„ fimbriatum <i>Sm.</i>	...	...	...	...	10
„ flaccidum ...	...	...	...	...	„
„ Javanicum ...	...	...	...	...	„
„ microsorum ...	...	...	...	...	„
„ polyanthos ...	...	...	...	...	10
„ Simonsianum ...	...	...	...	...	„
„ Smithii ...	...	...	...	...	„
Kalka jaup ...	...	...	...	...	48
Kaulfussia Assamica ...	...	...	...	...	64
„ esculifolia ...	...	...	...	...	„
Lastroea,—see Nephrodium.					
„ cburnea ...	...	...	...	...	28
„ sericea ...	...	...	...	...	36

	<i>Page.</i>
Leucostegia see,—Davallia.	
„ Hookeri ...	49
Lindsaya cultrata ...	15
„ ensifolia ...	„
„ flabellulata ...	„
„ pectinata ...	„
Litobrachia,—see Pteris.	
Lomaria euphlebia ...	22
„ glauca ...	„
„ longifolia ...	60
„ pycnophylla ...	22
„ scandens ...	60
Lygodium Microphyllum ...	64
„ pinnatifidum... ..	„
„ scandens ...	„
„ semibippinnatum ...	„
Marattia pinuata ...	64
Meniscium cuspidatum ...	59
„ deltigerum ...	61
„ triphyllum ...	59
Nephrodium affine ...	37
„ alatum ...	45
„ angustifrons ...	41
„ apiciflorum ...	38
„ barbigerum ...	„
„ Bergianum ...	37
„ Boryanum ...	40
„ Brunonianum ...	38
„ calcaratum ...	36
„ canescens ...	43
„ canum ...	36
„ cicutarium ...	46
„ Clarkei ...	37-38, 44
„ cochleatum ...	37
„ crinipes ...	44
„ cuspidatum ...	35
„ decurrens ...	46
„ dilatatum ...	39
„ dissecta, <i>Desr.</i> ...	45
„ dissectum ...	40
„ elongatum ...	37
„ Elwesii ...	36
„ ensorum ...	43
„ Falconeri ...	39
„ ferox ...	43
„ Filix Mas ...	37
„ flaccidum ...	38
„ fuscipes ...	45
„ giganteum ...	44
„ gracilescens ...	36
„ gracilis ...	39

						<i>Page.</i>
Nephrodium	Hendersoni	...	...	...	...	41
"	heterosorum	...	...	...	...	45
"	hirtipes	...	...	...	...	35
"	immersum	...	...	...	...	36
"	intermedium	...	...	...	...	38
"	Leuzeanum	...	...	...	...	41
"	Macrocarpum	<i>Bedd.</i>	...	...	...	45
"	Membrainifolium	...	...	...	...	40
"	Molle	...	...	...	...	43
"	Nidus	...	...	...	...	37
"	Nitidulum	...	...	...	...	39
"	Occhodes	...	...	...	...	36
"	odontoloma	...	...	...	...	37
"	odoratum	...	...	...	...	39
"	patens	...	...	...	...	41
"	patentissima	...	...	...	...	37
"	platypus	...	...	...	...	38
"	polymorphum	...	...	...	...	41
"	prolixum	...	...	...	...	45
"	pulvinuliferum	...	...	...	...	36
"	purpurascens	...	...	...	...	40
"	setigerum	...	...	...	...	39
"	Simonsii	...	...	...	...	41
"	Smyrmaticum	...	...	...	...	45
"	sparsum	...	...	...	...	37
"	splendens	...	...	...	...	39
"	subconfluens	...	...	...	...	40
"	subtryphyllum	...	...	...	...	46
"	Thelypteris	...	...	...	...	45
"	truncatum	...	...	...	...	37
"	Tyloides	...	...	...	...	43
"	Urophyllum	<i>Wal.</i>	...	...	...	36
"	Variolosum	...	...	...	...	48
"	Vastum	...	...	...	...	46
Nephrolepis	cordifolia	...	...	...	...	44
"	delicatula	...	...	...	...	46
"	edule	...	...	...	...	"
"	exaltata	...	...	...	...	"
Niphobolus,	see Polypodium	...	...	...	...
Nothochlæna	maranta	...	...	...	...	57
"	undulata	...	...	...	...	61
Oleandra	Cumingii	...	...	...	...	47
"	longipes	...	...	...	...	"
"	neriiformis	...	...	...	...	46
"	Wallichii	...	...	...	...	47
Onoclea	orientalis	...	...	...	...	8
Onychium	auratum	...	...	...	...	18
"	Japonicum	...	...	...	...	77
Ophioglossum	cordifolium	...	...	...	...	65
"	filiforme	...	...	...	...	64
"	pendulum	...	...	...	...	65

						<i>Page.</i>
Ophioglossum reticulatum	...	...	...	...	...	65
„ vulgatum	...	...	...	...	...	„
Osmunda Claytoniana	...	...	...	...	...	63
„ monticola	...	...	...	...	...	„
„ pilosa	...	...	...	...	...	„
„ regalis	...	...	...	...	...	„
„ speciosa	...	...	...	...	...	53
„ zeylandica	...	...	...	...	...	65
Panna valli	...	...	...	...	...	60
Pellœa gracilis	...	...	...	...	...	18
Phlegopteris,—see Polypodium.						
„ Scottii	...	...	...	...	...	35
Plagiogyria see,—Lomaria.						
Plcocnemis,—see Nephrodium.						
Pœsia,—see Pteris.						
Polypodium adnaseens	...	...	...	...	...	51
„ amœnum	...	...	...	...	...	50
„ angustatum	...	...	...	...	...	53
„ appendiculatum	...	...	...	...	...	48
„ argutum	...	...	...	...	...	51
„ auriculatum	...	...	...	...	...	48
„ Boothii	...	...	...	...	...	52
„ capitellatum	...	...	...	...	...	56
„ Clarkei	...	...	...	...	...	49
„ conifolium	...	...	...	...	...	50
„ conjugatum	...	...	...	...	...	53
„ coriaceum	...	...	...	...	...	53
„ coronans	...	...	...	...	...	55
„ costatum	...	...	...	...	49. ...	57
„ cuspidatum	...	...	...	...	...	59
„ darœforme	...	...	...	...	...	45
„ dilatatum	...	...	...	...	...	„8
„ distans	...	...	...	...	...	55
„ Dryopteris	...	...	...	...	...	35
„ ebenipes	...	...	...	...	...	57
„ elongatum	...	...	...	...	...	50
„ erubescens	...	...	...	...	...	25
„ erythrocarpum	...	...	...	...	...	„
„ fissum	...	...	...	...	...	„
„ floccigerum	...	...	...	...	...	„
„ flocculosum	...	...	...	...	...	„
„ glabrum Roxb	...	...	...	...	...	54
„ grandifolium	...	...	...	...	...	„
„ Griffithianum	...	...	...	...	...	33
„ hemionitidum	...	...	...	...	...	54
„ Hendersoni	...	...	...	...	...	50
„ heteractis	...	...	...	...	...	51
„ heterocarpum	...	...	...	...	...	64
„ himalayense	...	...	...	...	...	56
„ irioides	...	...	...	...	...	54
„ Juglandifolium	...	...	...	...	...	56

					<i>Page.</i>
Polypodium Khasianum	...	...	...	...	49
" Lachnopus ...	...	...	...	...	50
" latus ...	...	...	...	...	51
" Lehmauni ...	...	...	...	...	56
" Leiorhizon ...	...	...	...	...	"
" lineare ...	...	...	...	...	53
" lineatum ...	...	...	...	...	48
" lingua ...	...	...	...	...	51
" longissimum...	...	...	...	...	55
" malacodon ...	...	...	...	...	"
" melanoneuron	...	...	...	...	"
" melanococca ...	...	...	...	...	"
" membranaceum	...	...	...	...	54
" microrhizoma	...	...	...	...	50
" molle, <i>Bedd.</i>	...	...	...	...	56
" Moulmeinense	...	...	...	...	48
" Multilineatum	...	...	...	...	94
" Mysurense ...	...	...	...	...	52
" normale ...	...	...	...	...	53
" numularifolium	...	...	...	...	52
" nigrescens ...	...	...	...	...	55
" nivale ...	...	...	...	...	56
" ovatum ...	...	...	...	...	53
" parvulum ...	...	...	...	...	49
" persicifolium...	...	...	...	...	51
" pertussum ...	...	...	...	...	"
" phymatodes ...	...	...	...	...	55
Phymatodes,—see Polypodium.					
Polypodium proliferum ...	...	...	...	...	48
" propinquum ...	...	...	...	...	56
" pteropus ...	...	...	...	...	54
" punctatum ...	...	...	...	...	48
" Quercifolium ...	...	...	...	...	56
" rhyncophyllum	...	...	...	...	53
" rostratum ...	...	...	...	...	"
" rubida ...	...	...	...	...	55
" scolopendria ...	...	...	...	...	"
" sphærocarpum	...	...	...	...	53
" Stewartii ...	...	...	...	...	55
" stigmatosum ...	...	...	...	...	51
" subauriculatum	...	...	...	...	"
" subdigitatum ...	...	...	...	...	50
" subfalcatum ...	...	...	...	...	49
" subfurfuraceum	...	...	...	...	52
" superficiale ...	...	...	...	...	53
" tencrum ...	...	...	...	...	44
" tomentosum ...	...	...	...	...	52
" trichomanoides	...	...	...	...	49
" trifidum ...	...	...	...	...	54
" urophyllum ...	...	...	...	...	48
" verruculosum	...	...	...	...	51

					<i>Page.</i>
Polypodium Wallichii ...	...	...	...	...	54
Polystichum,—see Aspidium.					
Pteris aquilina ...	...	...	...	...	21
" crenata Sw. ...	...	...	...	...	20
" Cretica ...	...	...	...	...	19
" dactylina ...	...	...	...	...	21
" ensiformis ...	...	...	...	...	20
" excelsa ...	...	...	...	...	"
" Griffithii ...	...	...	...	...	"
" longifolia ...	...	...	...	...	19
" longipinnula ...	...	...	...	...	20
" pellucens ...	...	...	...	...	21
" pellucida ...	...	...	...	...	19
" quadriaurita ...	...	...	...	...	20
" semipinnata ...	...	...	...	...	21
" stenophylla ...	...	...	...	...	19
Sagenia,—see Nephrodium.					
Schizœa digitata ...	...	...	...	...	63
Sphæropteris barbata ...	...	...	...	...	9
Stenochlœna,—see Acrostichum.					
Thamnopteris,—see Asplenium.					
Tæniopsis,—see Vittaria.					
Trichomanes auriculatum ...	...	...	...	...	11
" exigium ...	...	...	...	...	"
" filicula ...	...	...	...	...	"
" insigne ...	...	...	...	...	"
" javanicum ...	...	...	...	...	"
" nanum ...	...	...	...	...	"
" pyxidiferum ...	...	...	...	...	"
" radicans ...	...	...	...	...	"
Tsjeria valli Panni ...	...	...	...	...	6
Tsjuria valli Panni ...	...	...	...	...	"
Vittaria elongata ...	...	...	...	...	59
" lineata ...	...	...	...	...	60
Woodsia elongata ...	...	...	...	...	9
" nyperborea ...	...	...	...	...	"
" lanosa ...	...	...	...	...	"

